



Hand Painted Prop

By Trent Comolli

Welcome to this comprehensive tutorial on modeling and hand painting a prop based on a provided concept! This guide will lead you through each stage of the process, including project setup, blocking out, refinement, unwrapping, texturing, and finally, exporting and rendering in Sketchfab. In addition to this written guide, you'll have access to a full video series that demonstrates each step in far greater detail, project files from major stages, and an interactive 3D view of all major stages using Sketchfab. These resources are available in the [Resources](#) tab at the top of each relevant section.

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Stage 0 - Introduction

Resources

Video - https://youtu.be/IZYOKIW_nfk

Project Files - <https://bit.ly/3Z4uqWX>

Sketchfab - <https://bit.ly/4g9xaIS>

Concept Image - <https://www.artstation.com/artwork/VXPQR>

Pureref - <https://www.pureref.com/download.php>

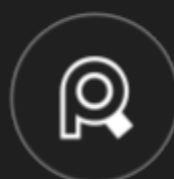
Software Used



Photoshop



Substance Painter



Pureref



Autodesk Maya

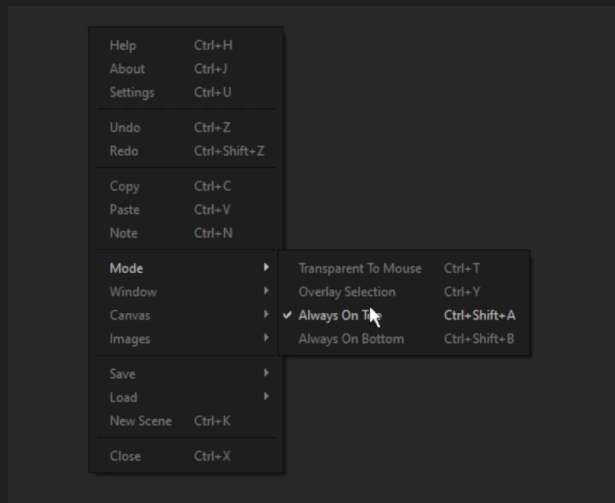
Stage 0.1 - Project Folders

Start by creating a parent folder for our project in your desired location

Then create the following sub-folders

- Assets (Exported models and textures)
- Project Files (Maya / Painter files)
- Reference (Concept art and Pureref file)

Stage 0.2 - Reference Setup



Next we will set up our reference folder, simply drag our concept art into the folder and open the free software Pureref (either download the concept through the Project Files or the Artstation Link located in Resources)

Pureref Navigation Basics

- **Right-click + Drag:** Move the Pureref window on your screen
- **Click + Drag Edge:** Resize Pureref window
- **Middle Mouse Button + Drag:** Pan the view around the canvas
- **Scroll Wheel:** Zoom in and out

You will be met with a blank canvas when Pureref opens, perform the following steps

- Drag concept art into Pureref window
- Set mode to Always on Top (**Right-Click > Mode > Always on Top**)
- Save in reference folder and close Pureref

Always on Top will allow our Pureref window to render over other applications

Stage 0.3 - Starting Maya

Now open Maya and create a new project. We will save our project in iterations so let's start by saving the newly opened project in our project files folder.

File > Save Scene As > “Locate your Project Files folder” > Save As

Use whatever naming convention you like when saving the project, in the video documentation I used “Potion_01”

If you are new to navigating 3D software or to Maya, below is a list of all the basic controls and tools we will be using in this tutorial. Feel free to experiment with what they do or refer back to this list if needed.

Maya Navigation Basics

Mouse and Keyboard Navigation:

- **Alt + Left Mouse Button (LMB):** Rotate the camera around the scene.
- **Shift + Alt + LMB:** (Roll Camera) Rotates the camera around its view axis (useful for aligning the horizon).
- **Alt + Middle Mouse Button (MMB):** Pan the camera left, right, up, or down without rotating.
- **Alt + Right Mouse Button (RMB) or Scroll Wheel:** Zoom the camera in and out smoothly.

Hotkeys and Tools:

- **F:** (Frame Selected) Centers the camera on the selected object(s)
- **A:** (Frame All) Centers the camera to display all objects in the scene
- **Spacebar Hold:** (Hotbox Menu) Displays the quick-access menu for all Maya tools and panels.
- **Spacebar Press:** (Toggle Fullscreen View) Press in any panel to switch between full-screen and quad view (top, side, front, perspective). Press while hovering over a viewport to full screen it

Viewport Display Options:

- **1, 2, 3 Keys:** Polygon Smoothness Preview:
- **1:** Basic polygon mode (unsmoothed).
- **2:** Smoothed with both the low-res cage and smooth preview visible.
- **3:** Full smooth preview.
- **4: Wireframe Mode:** Displays only the wireframe of objects.
- **5: Shaded Mode:** Displays objects in solid shading mode.
- **6: Textured Mode:** Displays objects with textures applied.
- **7: Lighting Mode:** Displays objects as they appear with scene lighting applied.
- **Ctrl + Spacebar:** Hide/Show Interface: Quickly hide or show all UI elements for full-screen modeling.

Snapping and Precision Movement:

- **Hold X: (Grid Snapping)** Enables grid snapping to precisely align objects to the grid.
- **Hold C: (Curve Snapping)** Snaps objects or components to a curve.

- **Hold V: (Point Snapping)** Snaps objects to vertices of other objects.
- **Hold J: (Snap Rotate)** Rotates an object in incremental steps (default is 15 degrees).

Selection and Transformation Shortcuts:

- **Q: Select Tool:** Basic selection without any transformation.
- **W: Move Tool:** Allows movement/translation of objects in the scene.
- **E: Rotate Tool:** Allows rotation of objects in the scene.
- **R: Scale Tool:** Allows scaling of objects.

Right-Click Marking Menus:

- **Hold Right Click (RMB) with an Object selected:**
 - Marking Menu for Object Components:
 - **Object Mode:** Switch back to selecting the entire object.
 - **Vertex:** Switch to vertex selection mode to manipulate individual vertices.
 - **Edge:** Switch to edge selection mode to manipulate individual edges.
 - **Face:** Switch to face selection mode to manipulate polygon faces.
 - **UV:** Switch to UV mode for UV mapping tasks.

Shift + Right Click (RMB) Marking Menus:

- **Hold Shift + RMB (in Object Mode):**
 - Marking Menu for Object Manipulation Tools:
 - **Delete History:** Quickly clears the construction history of the selected object.
 - **Freeze Transformations:** Freezes the current transformations (translation, rotation, scale) of the object.
 - **Center Pivot:** Centers the pivot of the object.
 - **Mirror Geometry:** Provides mirroring options for the object.
 - **Combine/Separate:** Allows combining multiple objects into one or separating them into individual objects.
- **Hold Shift + RMB (in Component Mode - Vertex/Edge/Face):**
 - Marking Menu for Common Modeling Operations:
 - **Extrude:** Quickly extrude selected components.
 - **Bevel:** Adds a bevel to the selected edges or faces.
 - **Bridge:** Creates a bridge between selected edges or faces.
 - **Insert Edge Loop Tool:** Adds new edge loops to the selected object.
 - **Multi-Cut Tool:** Allows precise cutting and adding of new edges.
 - **Merge:** Merges selected vertices or edges.

Stage 0.4 - Image Plane

Start by bringing a cube into the scene to determine the scale of our prop

- Navigate to the “Poly Modeling” shelf along the toolbar at the top of the screen
- Click the Polygon Cube to create cube at the center of your scene

With the cube selected, on the right hand side of the screen you will notice the channel box with our objects transform information and a tab for “Inputs” just below it

You should have one input for “polyCube1”. Clicking this will unfold the parameters that control our objects default dimensions and subdivisions. (By default Maya uses Centimeters as its standard unit so our cube should come in at 1 cm)
Ensure the cube has a Height, Width and Depth of 30 cm.

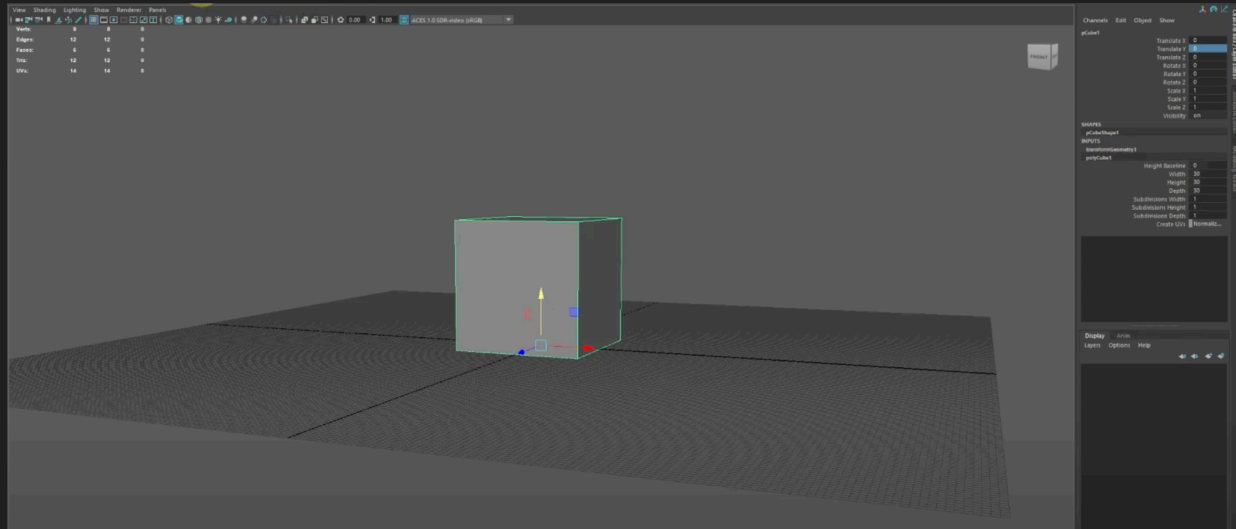
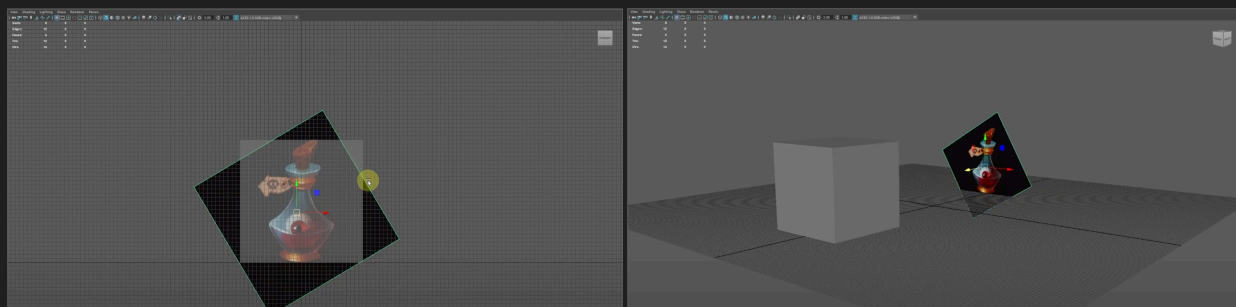


Image Plane Setup:

- **Importing an Image Plane:** To use your concept art as a guide during modeling, import it as an image plane in the front viewport. Go to **View > Image Plane > Import Image**, and select your reference image from the reference folder.
- **Scaling and Positioning:** Adjust the image plane so that it aligns with the reference cube and the modeling grid. Make sure the image plane is correctly scaled and oriented, matching the size of the reference cube.
- **Enabling X-Ray Mode:** To see your model and image plane simultaneously, enable X-Ray mode by going to **Shading > X-Ray**. This will make your model semi-transparent, allowing you to align it more easily with the reference image behind it.
- **Layer Management for Reference Images:** Once the image plane is in place, add it to a new layer by selecting the image plane and clicking the **Create New Layer** button in the Layer Editor. Rename the layer (e.g., "Ref_Image"). Lock the layer by clicking the empty box next to the layer name until an "R" appears to prevent accidental selection or movement.



Stage 1 - Blockout

Resources

Video - <https://youtu.be/2inXqmNcxzU>

Project Files - <https://bit.ly/4ejlaTv>

Sketchfab - <https://bit.ly/4g9xaIS>

Stage 1.1 - Identifying Basic Shapes

Start by analyzing the basic shapes of your prop. For instance, our prop consists primarily of cylinders. For example:

- Cylinders: Various pieces of the bottle and cork,
- Spheres: The eyeball
- Cube: The tag



Stage 1.2 - Base Cylinder

1. Add a Polygon Cylinder:

Go to [Create > Polygon Primitives > Cylinder](#) or add from Poly Modeling shelf.

In the [Channel Box](#) or [Attribute Editor](#), adjust the cylinder's subdivisions:

- Set Subdivisions Axis to 20 to ensure a smooth appearance without excessive polygonal detail.

2. Positioning the Cylinder:

Move Tool: Press [W](#) to activate the Move Tool. Drag the cylinder to the desired position.

Ensure the cylinder is centered correctly by using the grid as a reference.

3. Delete Unnecessary Faces:

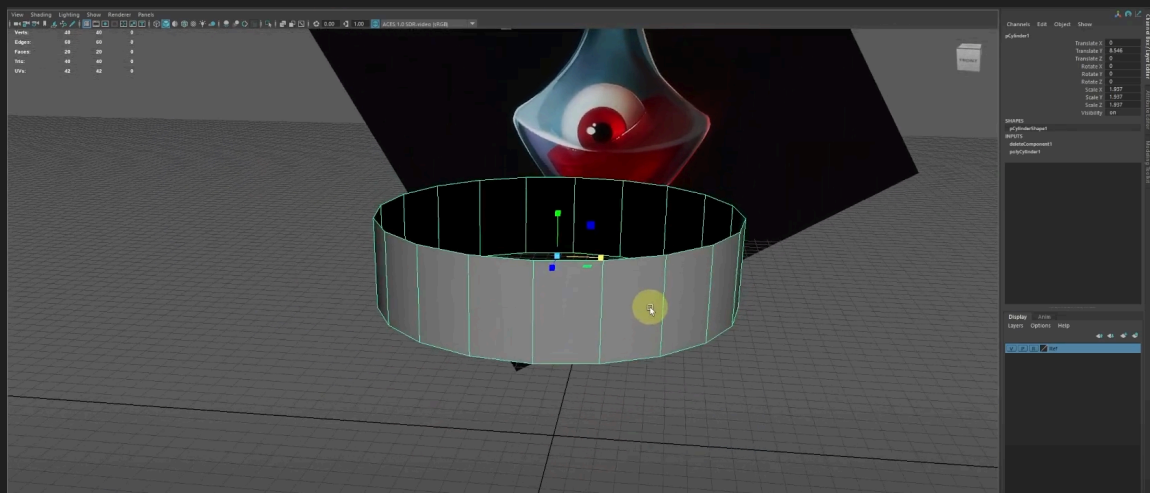
- Face Mode: Right-click with the cylinder selected and select [Face](#)
Delete Faces: Select unnecessary faces (e.g., the bottom and top faces) and delete them by pressing [Delete](#).

4. Scaling the Cylinder:

Object Mode: Ensure you are in Object Mode. Press [R](#) to activate the Scale Tool.

Uniform Scaling: Scale uniformly by adjusting the central scale handles.

- Ensure the cylinder is roughly in scale with the concept image.



Stage 1.3 - Editing the Cylinder's Shape

1. Adding Edge Loops:

Multicut Tool: Access the Multicut Tool by going to [Mesh Tools > Multicut Tool](#) or pressing [Shift + Right Click > Multicut Tool](#).

Add Edge Loops: Hover over the edges where you want to add loops. Holding Ctrl while dragging will show you where the edge loop will be placed. Either click

to add loop or **middle mouse button (MMB)** to add the loop at the center of the edge



2. Extruding Edges:

Select Edges: Switch to Edge Mode by right-clicking and selecting **Edge**.

Loop Select: **Double Click** an edge to select the entire loop.

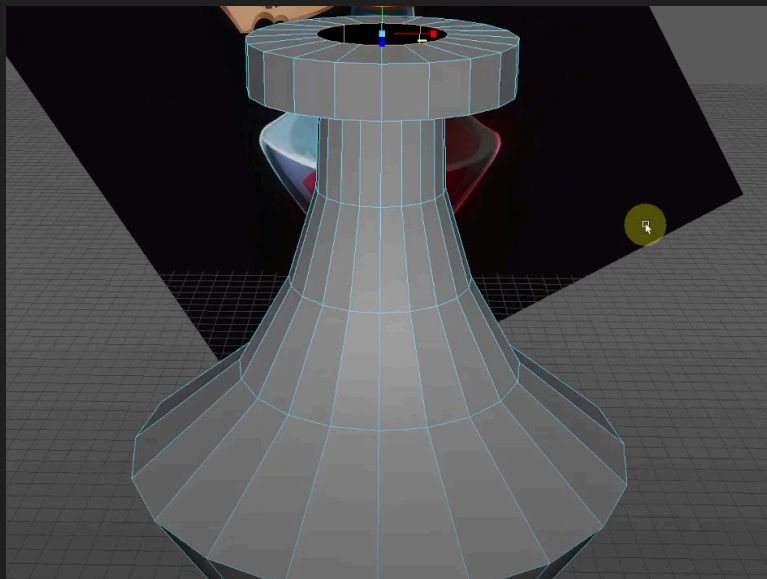
Extrude: Press **Ctrl + E** to extrude selected edges. Drag the extruded edges with **W** to form the desired shape.

- You want to extrude and scale edges of the cylinder till you have a rough shape of the bottle (Make sure to leave an opening at the top)

3. Refining the Shape:

Scale Edge Loops: Select the newly added edge loops and scale them using **R** to adjust the proportions and details.

- Remember not to add too many loops, we just want to capture the basic shape at this stage

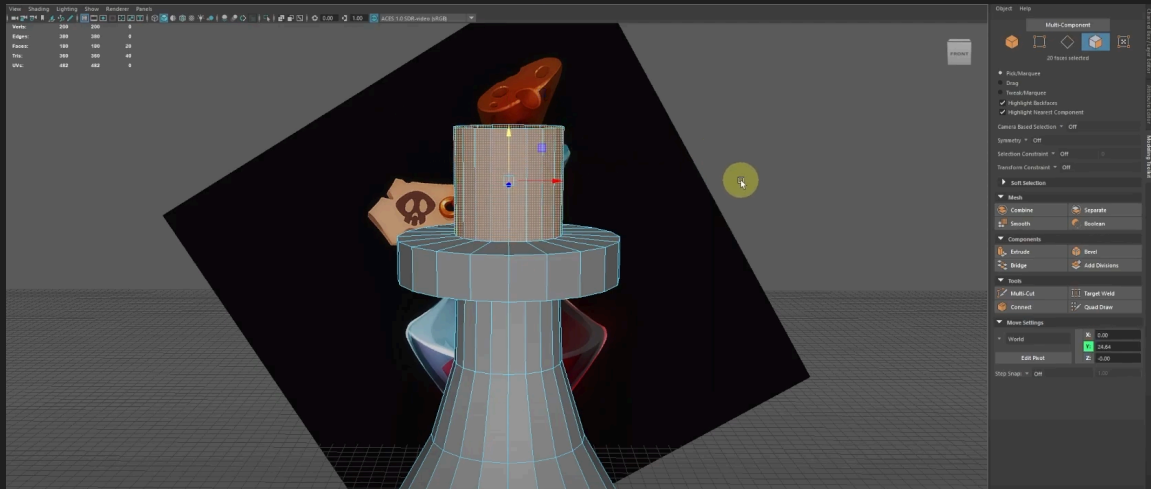


Stage 1.4 - Creating and Adjusting the Cork

1. Extruding the Cork:

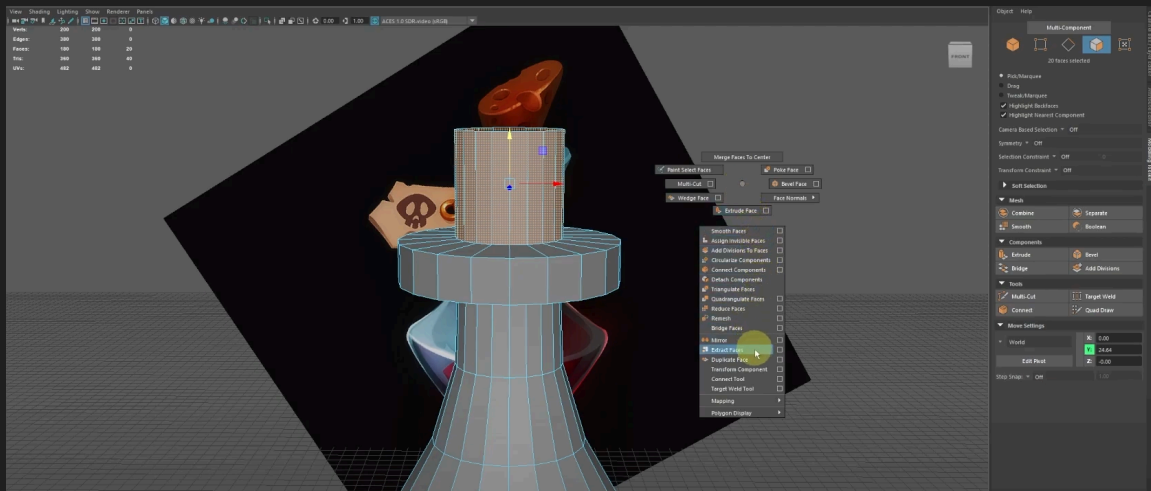
Top Edge Loop: Select the edges at the top of the cylinder where the cork will be.
(Opening at the top of the bottle)

Extrude Cork: Use **Ctrl + E** to extrude upwards to form the cork's base.



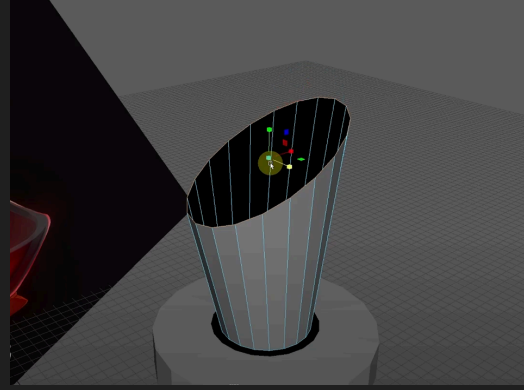
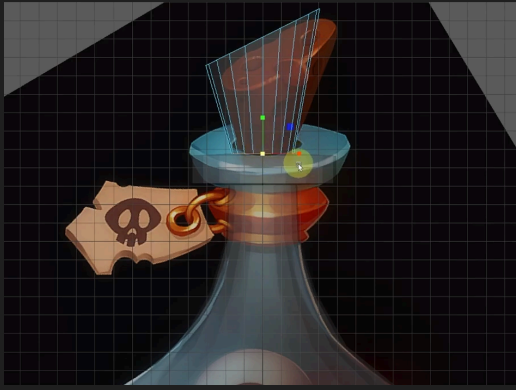
2. Separate the Cork:

Extract Faces: Select the faces forming the cork and use **Shift + Right Click > Extract Faces** to separate them from the bottle.



3. Adjusting Shape:

Scale Tool: Use **R** to scale the edge loops of the cork to fit appropriately on the bottle. Adjust its width and height to match your concept.



4. Center Pivot:

Reposition Pivot: Select the cork, go to [Modify > Center Pivot](#) to reposition the pivot point to the center of the cork.

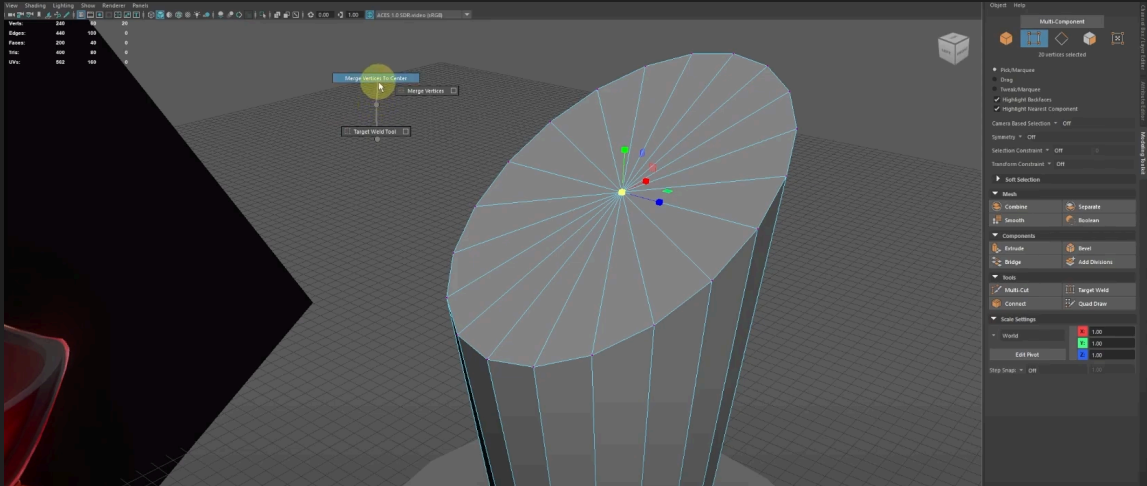
5. Merge Vertices:

Extrude Edges: Extrude both top and bottom edges and scale them inward

Select Vertices: In Vertex Mode, select the vertices of edges we just extruded.

Merge Vertices: Use [Shift + Right Click > Merge Vertices](#) to weld floating points.

Choose [Merge to Center](#) if you want them welded to their combined center point.



Stage 1.5 - Adding the Tag

1. Add a Polygon Plane:

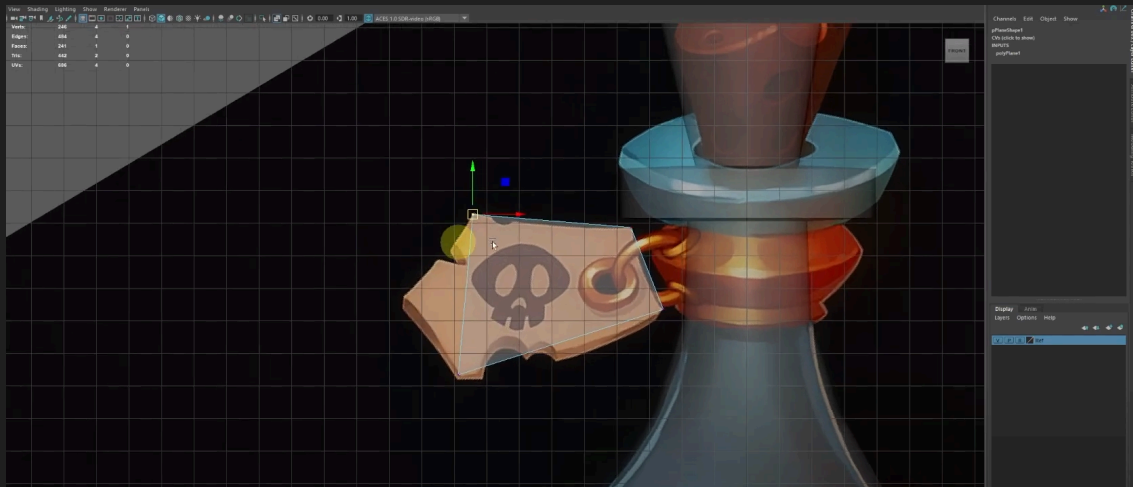
Go to [Create > Polygon Primitives > Plane](#).

Adjust Subdivisions: In the [Attribute Editor](#), set the Width Segments and Height Segments to 1 for simplicity.

2. Position and Rotate:

Move Tool: Use **W** to position the plane where the tag will be attached.

Rotate Tool: Press **E** to rotate the plane. Hold **J** to snap rotations for precise alignment. In Vertex mode, position the vertices of the plane at the edges of the tag.



3. Extrude Edge:

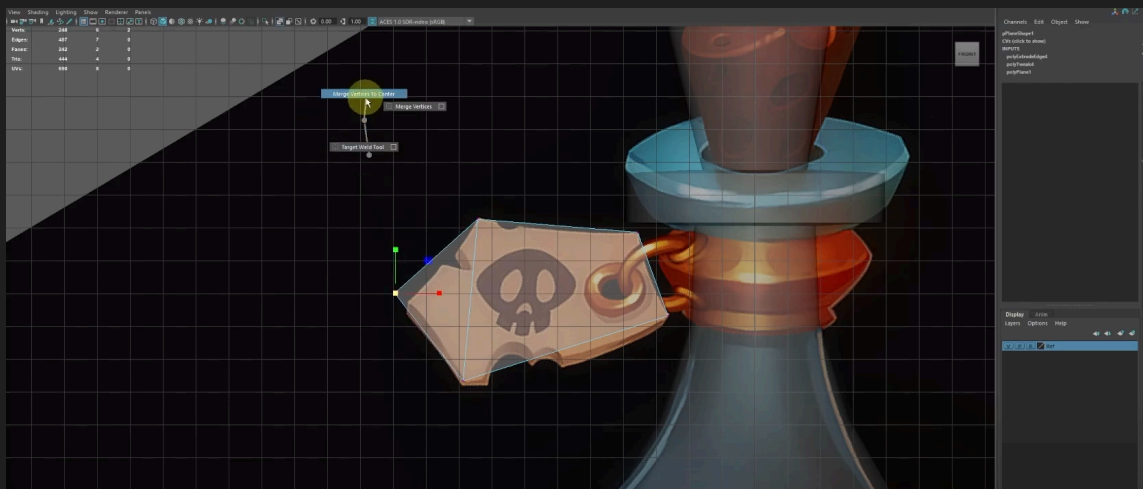
Edge Mode: Select the edge at the end of the plane to form the tag.

Extrude: Use **Ctrl + E** to extrude and drag out.

4. Merge Vertices:

Select Vertices: Select vertices at the tag's corners.

Merge Vertices: Use **Shift + Right Click > Merge Vertices** to clean up any floating points and ensure a solid tag structure.



Stage 1.6 - Adding the Collar

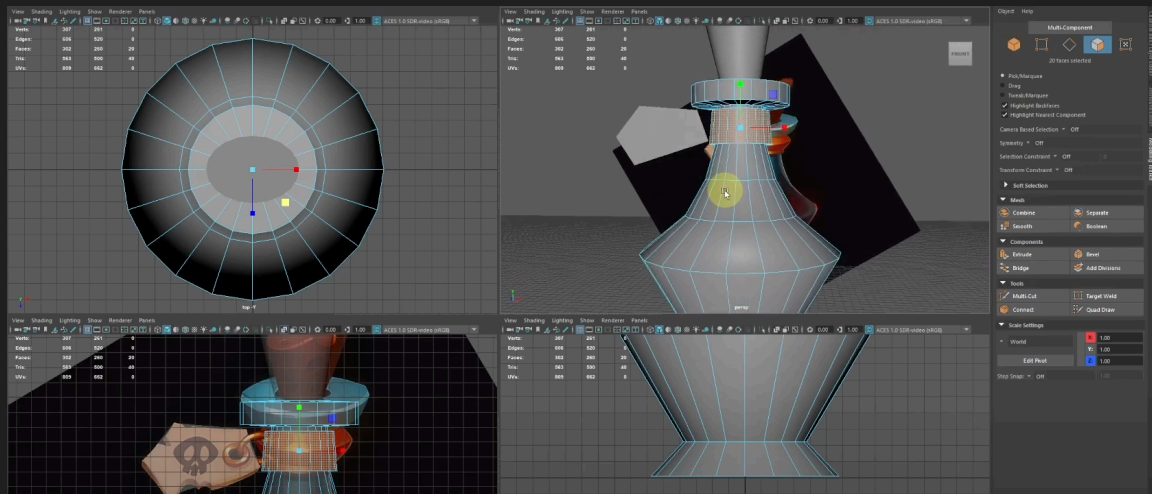
1. Add Edge Loops:

Multicut Tool: Use the [Multicut Tool](#) to add loops where the collar detail will be added.

Position Edge Loops: Adjust the edge loops to match the collar's design.

2. Extrude Collar:

Face Mode: Select the faces of the collar and extrude them outwards to create the collar's thickness.



Stage 1.7 - Final Adjustments and Clean-Up

1. Review the model in Multiple Viewports:

Rotate and zoom in different viewports to ensure the model's shape and proportions are accurate.

2. Smooth Edges:

Soften Edges: Select hard edges from extruding and use [Shift + Right Click > Soften Edges](#) to smooth the appearance without altering the model's structure.

Stage 1.8 - Prepare for Refinement

1. Save and Organize:

Save the File: Save your work regularly to avoid losing progress.

Organize Objects: Organize objects in your outliner by removing them from any created groups ([Cmd-Shift-G](#)), clear history on objects, ensure objects have easily identifiable names .

Stage 2 - Refinement

Resources

Video - <https://youtu.be/U67fpoY3OnQ>

Project Files - <https://bit.ly/3ZjAFq2>

Sketchfab - <https://bit.ly/4g9xaIS>

Stage 2.1 - Creating a New Save File

Before refining the model, it's essential to create a new save file to preserve previous versions of your work. Follow these steps:

2. Save Your Current Scene:

Use the shortcut [Ctrl+S](#) (or [Cmd+S](#) on macOS) to save the current scene.

3. Create a New Save File:

Navigate to your project files folder.

Create a new save file and name it appropriately, e.g., `potion_02.mb`. This ensures that you have multiple iterations of your project saved.

Stage 2.2 - Refining Large Surface Areas

Now that your project is saved, let's begin refining the model by smoothing out large surface areas and correcting any harsh angular lines.

1. Switch to Front Viewport:

In the viewport panel, switch to the Front View to get a clearer view of the model's profile.

2. Use the Multi-Cut Tool:

Access the [Modeling Toolkit](#) and select the [Multi-Cut tool](#) (You can also access this tool using the following methods. Go to [Mesh Tools > Multicut Tool](#) or by pressing [Shift + Right Click > Multicut Tool](#)).

Hold [Ctrl](#) to preview the placement of edge loops.

Click with the **MMB** to place edge loops at equal intervals between existing edges.

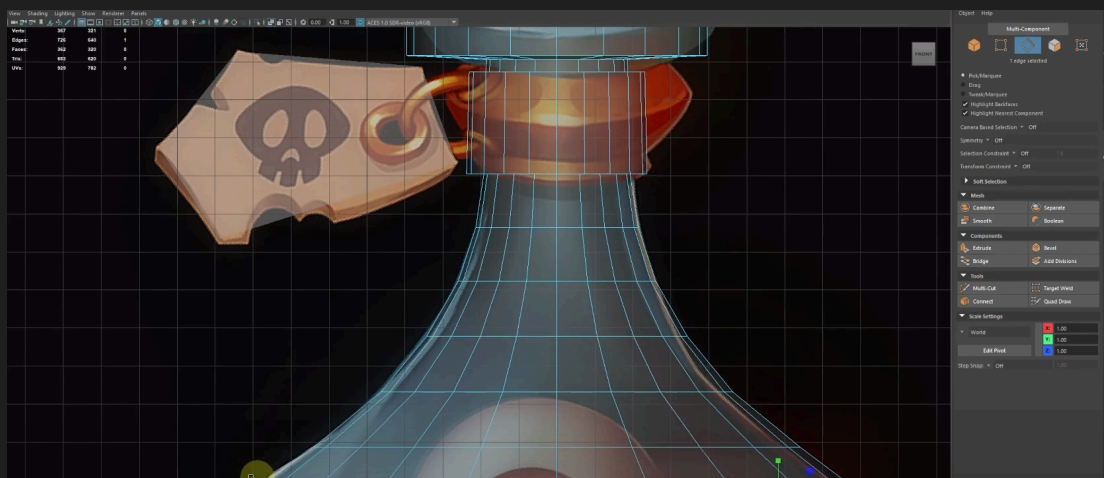
- Add what you feel is a sufficient amount of edge loops to the bottle in order to smooth out the shape.

3. Smoothing the Shape:

After adding edge loops, **double-click** on an edge to select the entire loop, then manually adjust the loop's scale uniformly.

Reposition edge loops as necessary by pressing **W** to use the move tool and holding **Ctrl + Shift** when moving to slide the loop along the object's surface.

- Focus on smoothing out the shape. Adjust based on what looks visually appealing to you.



Stage 2.3 - Beveling and Smoothing Edges

Enhance the model further by beveling and smoothing hard / abrupt edges for a polished look.

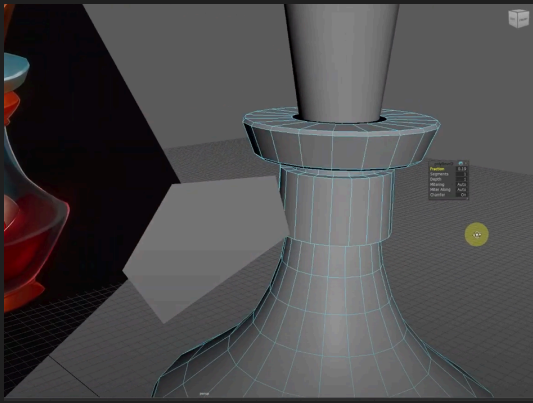
1. Select Large Edge Loops:

Double-click the edge loops you want to bevel, which will select the entire edge loop around the model.

2. Applying a Bevel:

Access the **Bevel** tool from the **Modeling Toolkit** or by holding **Shift + Right Click** and select **Bevel**. Adjust the bevel using the **MMB** to drag and control the amount.

Be cautious, as bevel adjustments can be sensitive. Holding **Ctrl** while dragging will give you more precision.



3. Adding Segments for Smoothing:

In the bevel options, some edges you may want to add an additional segment to round out the beveled edges. This will make the transition between edges smoother just be mindful of how many edges you are creating.

4. Repeat Process:

Repeat the process of adding extra edge loops where necessary and beveling edges in order to smooth the blockout of our model and replicate the shape of our concept.

Stage 2.4 - Adding Details to the Model

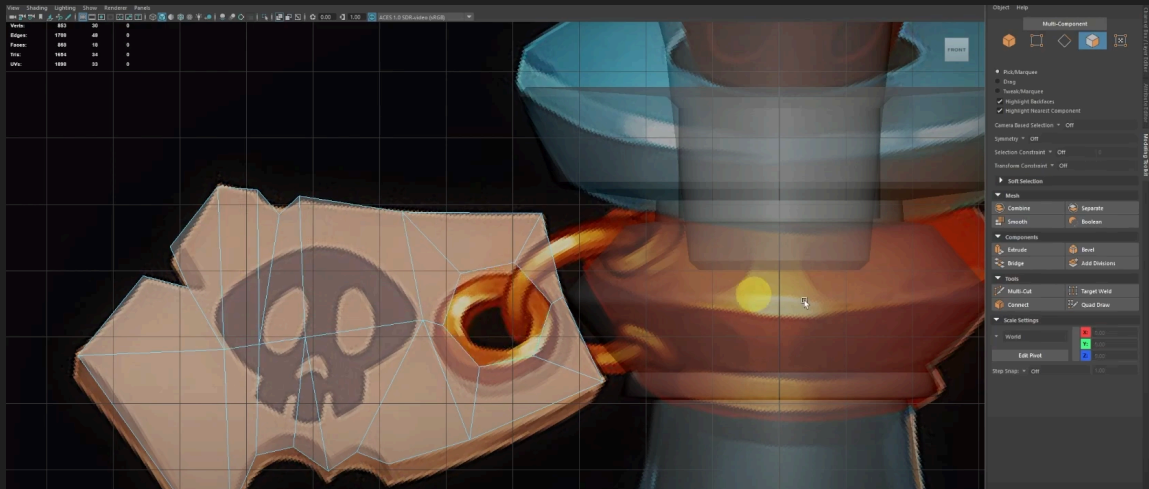
Add additional details such as defining the shape of the tag, adding rings to the collar and tag, and making adjustments for better representation of our concept.

1. Shaping the Tag:

Make cuts in the faces of the tag to resemble the nicks in the concept image. Go to [Mesh Tools > Multicut Tool](#) or by pressing [Shift + Right Click > Multicut Tool](#). Select a point on the outside edge to start the cut from > make a second cut on the face > bring the third cut back to the outside edge > repeat this for all nicks

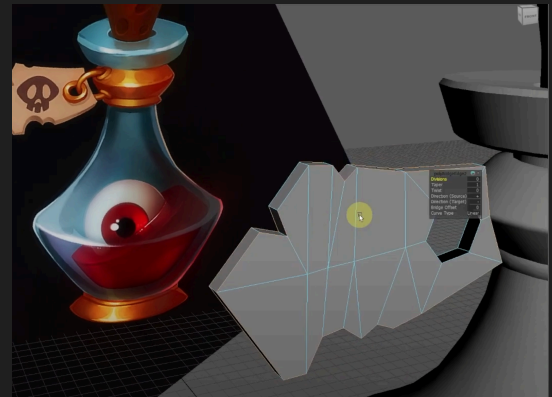


This process will create faces with more than 4 vertices (Referred to as N-Gons). We will need to manually add more cuts to ensure all faces have only 3 or 4 vertices connecting them.



Mirror: in object mode, select the tag and press **Shift + Right Click > Mirror**. Adjust the parameters so it mirrors to the correct side (Make sure merge threshold is set to 0 and cut geometry is off)

Bridge: Select the outside edge of the original tag mesh and the mirrored mesh. With both loops selected, use **Shift+Right Click** and select **Bridge**.

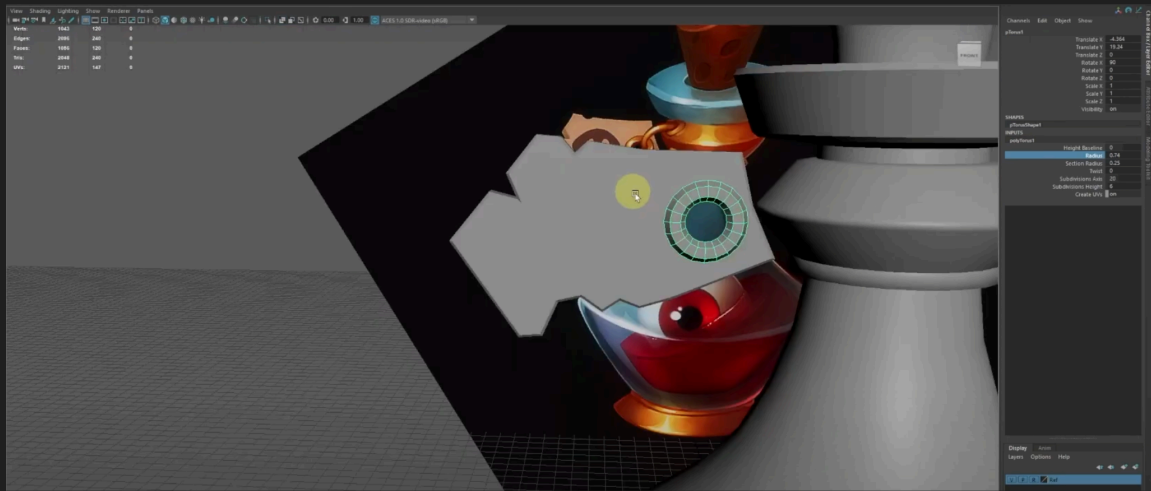


To add a little more shape we can also add a slight **Bevel** to the edges we just bridged

2. Creating and Placing Rings:

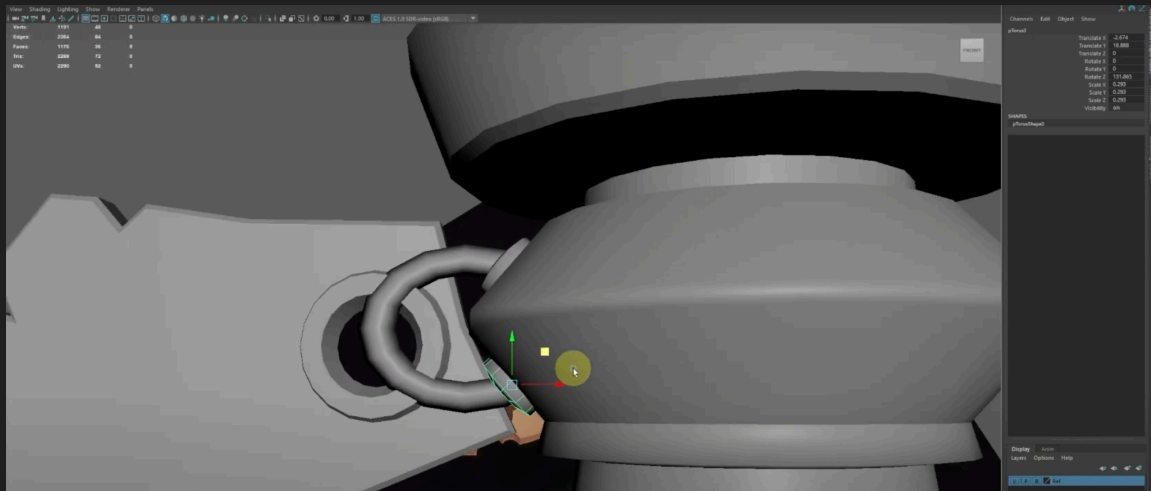
Tag Detail:

- Create a Torus for the tag detail.
- Adjust the section radius and radius to match the reference image.
- Move, scale, and position the Torus to fit accurately on the tag.
- Combine with the tag and clear history. Rename to tag_low.



Collar Detail:

- Create another Torus for the collar detail.
- Adjust the subdivision axis and height to achieve the desired look.
- Position and scale the Torus to fit the collar area.
- Delete any faces that will not be seen on the Tauruses (Faces inside the mesh)
- Combine with the collar and clear history. Rename to collar.



Stage 2.5 - Closing the Base and Collar

To close the base and collar, we need to extrude and weld the inside edges. We want to do this to avoid seeing inside these elements once we add opacity to our bottle when texturing. Follow these steps:

1. Extracting the Parts:

Extract the collar and base from the main mesh to work on them separately. Select all the faces that make up the base and collar, Use **Shift+Right Click** and select **Extract Faces**.

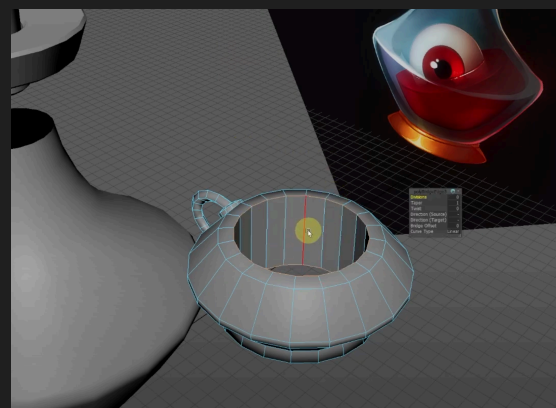
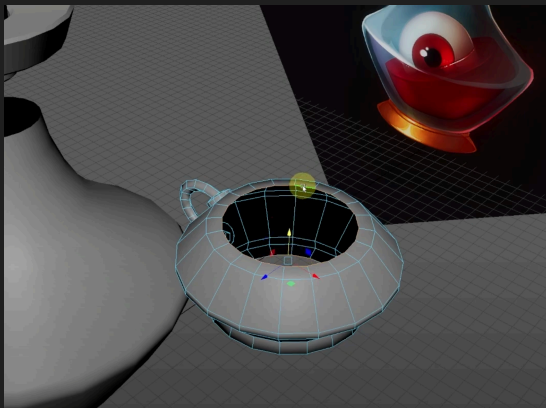
2. Closing the Base and Collar:

To make this stage easier you can select the collar and base and drag them out from the rest of the model for easier editing or toggle X-ray mode like we did earlier by [selecting Shading at the top of the viewport > toggle X-Ray](#) (Ensure the transforms on the object are zeroed out before moving so it will be easy to snap them back to their original location)

Bridge Collar:

Go to the top edge of the collar. Select the edge loop. Then hold shift and select the edge loop along the bottom.

With both loops selected, use [Shift+Right Click](#) and select [Bridge](#).

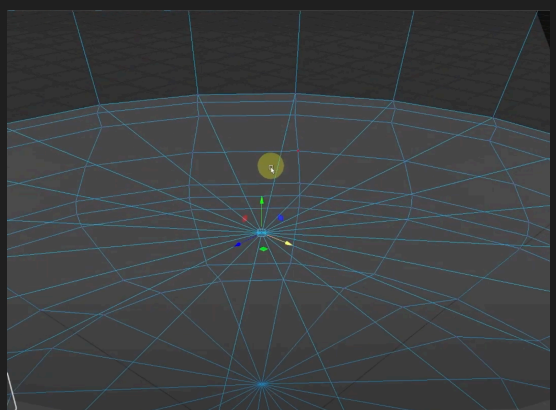
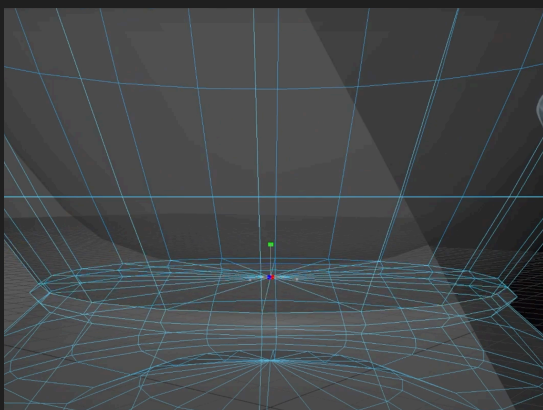


Extrude and Weld Base:

Go to the top edge of the base and select the edge loop.

Use [Ctrl+E](#) to extrude the edge toward the center of the mesh.

Switch to vertex mode, select the vertices around the edge, and use [Merge to Center](#) to weld them together.



Checking and Fixing Normals:

Ensure faces are correctly oriented. If any faces are reversed (Back faces will render as black instead of the default gray material), select them, go to **Mesh Display > Reverse**. Use **Shift+Right Click** and choose **Soften Edge** to adjust the appearance.

Move both the collar and base back to their original position if you moved them out.

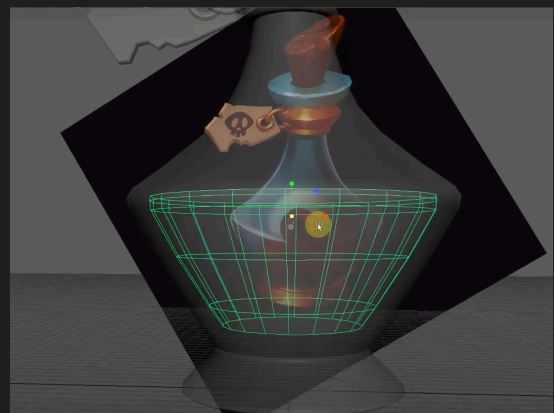
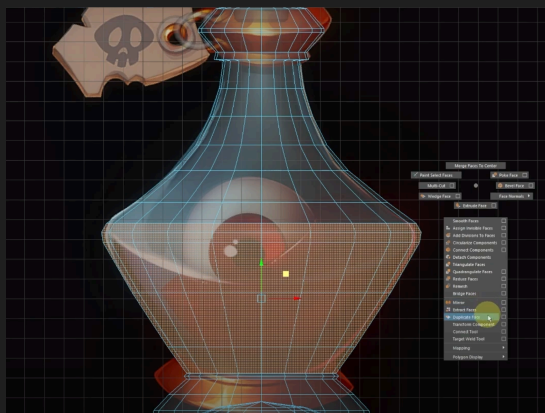
Stage 2.6 - Creating the Liquid and Eye

Refine the inside of the bottle and add the liquid and eye detail.

1. Adding the Liquid:

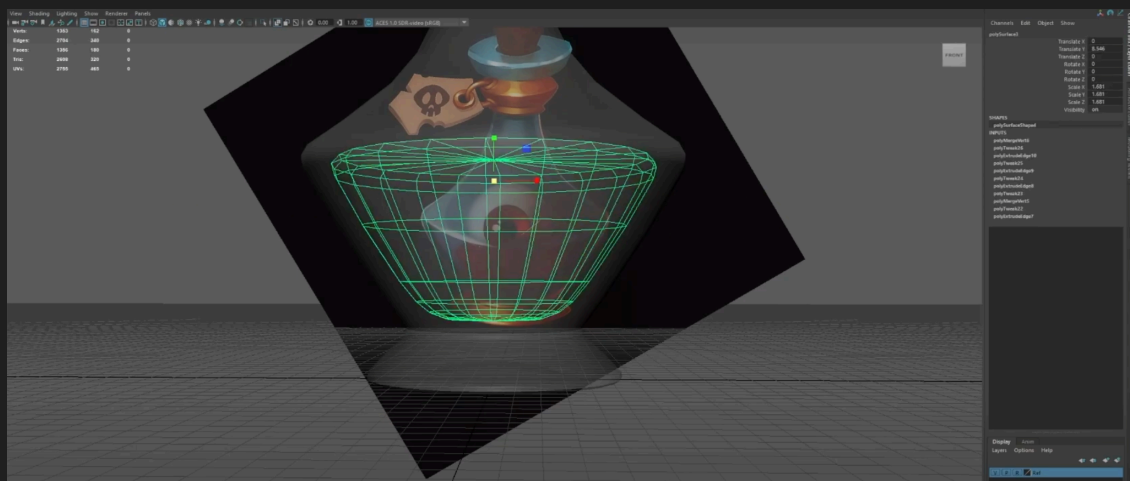
Duplicate Faces:

- Select the faces of the bottle that will be duplicated for the interior.
- Use **Shift+Right Click** and select **Duplicate Faces**. Offset slightly to create an inner bottle layer.



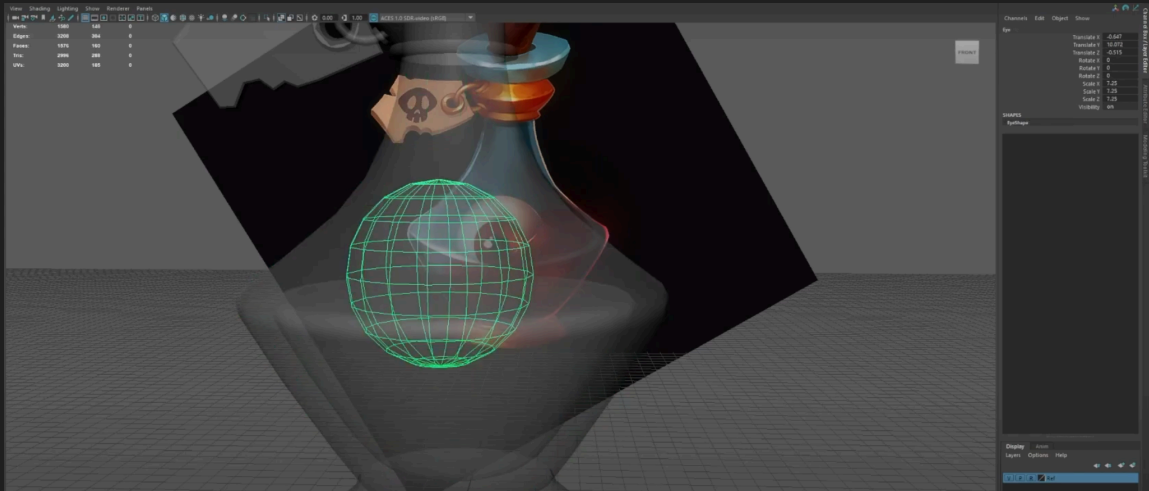
Adjusting and Closing:

- Scale down the duplicated layer to simulate “thickness” for the glass.
- Close the top and bottom edges, then extrude and merge the edges. Ensure no gaps remain.



2. Adding the Eye:

- Create a Sphere for the eye. Position and scale it within the bottle as per the reference image.
- Soften the eye's edges for a smoother look.



Stage 2.7 - Finalizing and Renaming

Finalize the model by renaming and cleaning up the scene.

3. Rename Components:

Rename the extracted components appropriately:

- Tag: tag_low
- Collar: collar_low
- Base: base_low
- Bottle: bottle_low
- Liquid: liquid_low
- Eye: eye_low

Ensure the naming convention is accurate as this will be essential when baking our mesh maps in Substance Painter. By default Painter will use the naming convention of "Object Name"_low but you can adjust this in Painter when we get to that stage.

4. Cleaning Up:

Clear any remaining history from the model.
Verify all parts are correctly positioned and named.

Stage 3 - Unwrapping

Resources

Video - <https://youtu.be/BM6dlHHR7E>

Project Files - <https://bit.ly/3MFw0Ho>

Sketchfab - <https://bit.ly/4g9xaIS>

Stage 3.1 - Creating a New Save File

Before refining the model, it's essential to create a new save file to preserve previous versions of your work. Follow these steps:

1. Save Your Current Scene:

Use the shortcut **Ctrl+S** (or **Cmd+S** on macOS) to save the current scene.

2. Create a New Save File:

Navigate to your project files folder.

Create a new save file and name it appropriately, e.g., `potion_03.mb`. This ensures that you have multiple iterations of your project saved.

Stage 3.2 - Preparing the Model for UV Unwrapping

1. Centering the Pivot Points

Select the model in Object Mode.

Use the **Center Pivot** (Can be located in your **Ploy Modeling shelf**) button to center the pivot on the mesh.

Ensure that your objects remain symmetrical. If the pivot point is off-center (e.g., for the collar), adjust it manually:

- Press the **D** key to enter Pivot Move Mode.
- Hold **X** when moving to snap the pivot based on the grid.

2. Clearing History

Clear the object's history to remove any unwanted transformations.

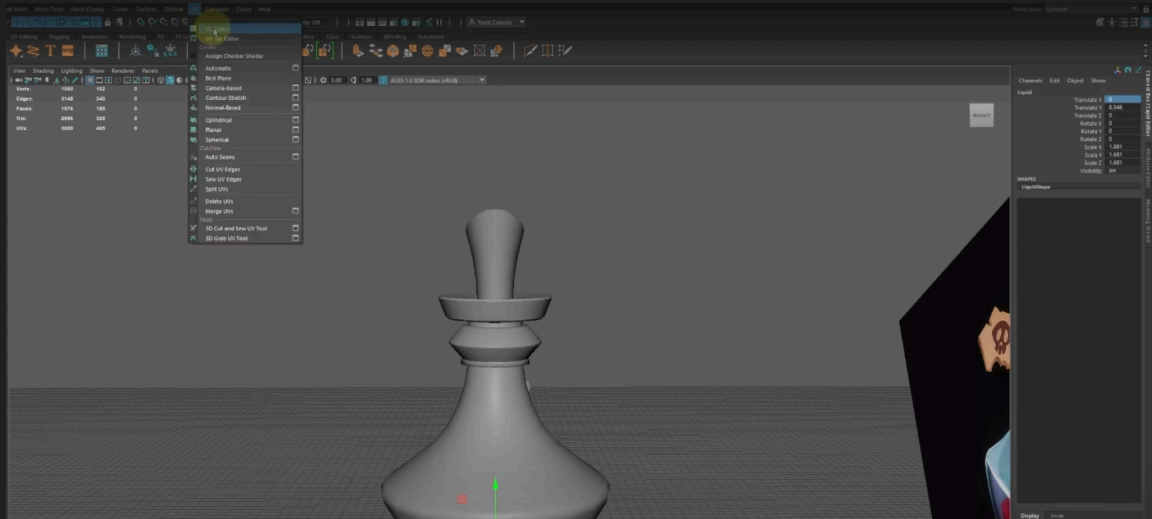
Stage 3.3 - Introduction to UV Unwrapping

1. Opening the UV Editor

Navigate to the **UV** menu at the top of Maya.

Select **UV Editor** to open the UV workspace.

Dock the UV Editor on the side of the screen for easy access.



2. Understanding UVs

UVs represent how textures will be projected onto your 3D model.

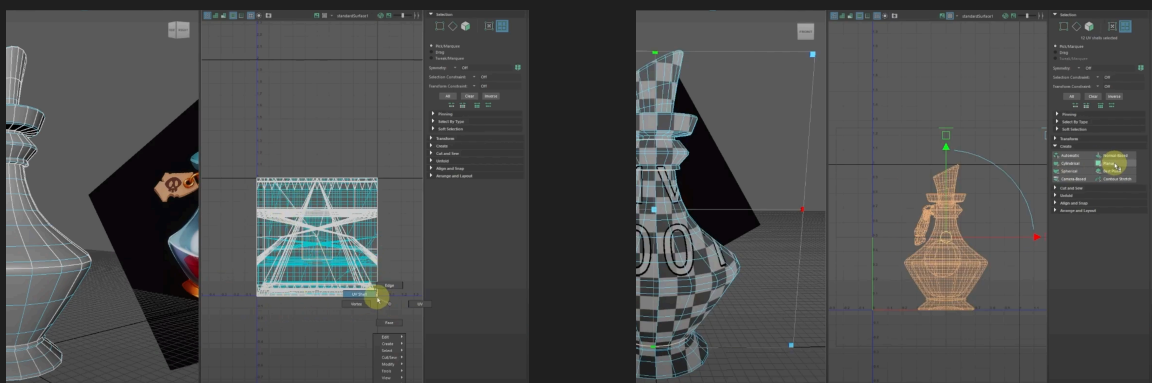
The UV space is a 2D coordinate system, similar to the X and Y axes, but referred to as U and V.

Your goal is to cut the model into UV shells that can be laid flat, minimizing distortion when texturing.

3. Viewing Existing UVs

In the UV Editor, right-click and select **UV Shell** to view the current UV layout.

Existing UVs will be messy, you can effectively reset them and erase all cuts by using a **Planar Mapping** projection. There are several ways to access this function but, with all objects selected, you can go to the **UV menu > Planar**



Stage 3.4 - Cutting Model

1. Cutting the Model in Half

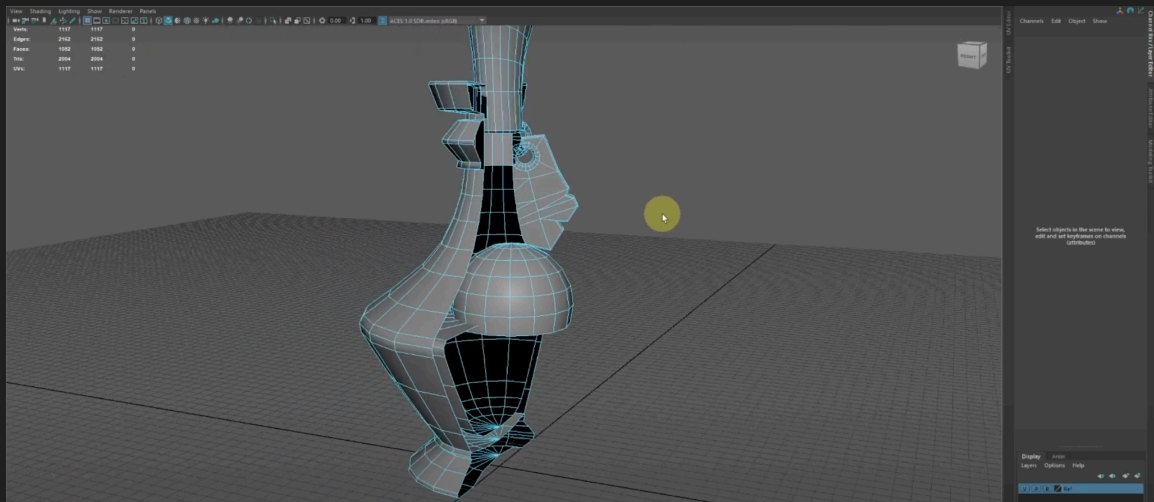
By cutting and unwrapping half of the model we can optimize our UV packing and save time on texturing. This is because our UV information is also mirrored when we mirror our mesh back.

Select the right half of the model in Face Mode.

Exclude areas you do not want to mirror, such as the cork and tag elements.

Double-check and deselect areas like the eye and Tauruses that shouldn't be mirrored.

Delete all selected faces.



2. Deleting Unnecessary Faces

Remove unnecessary faces on the eye that are blocked by liquid mesh as these will not be visible.

With all the necessary faces selected, delete them to simplify the geometry.

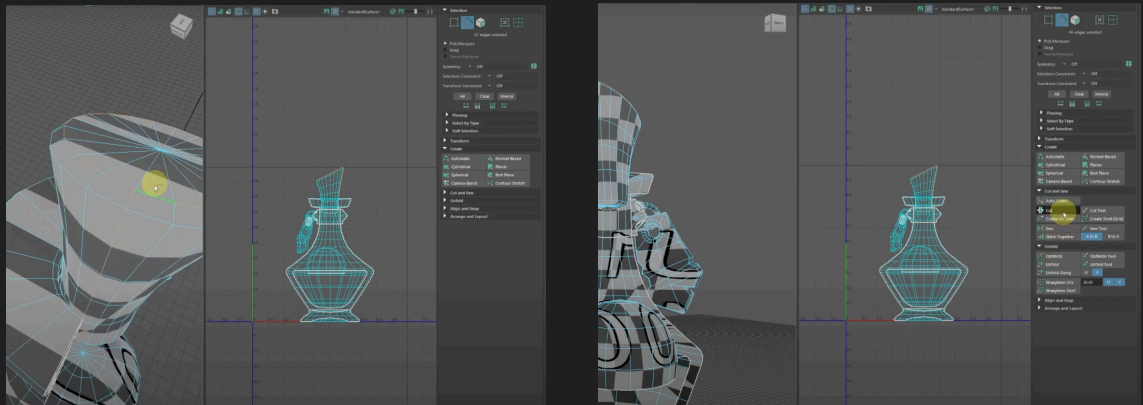
Stage 3.5 - Adding UV Cuts

1. Adding Cuts Along Hard Edges

Start by adding cuts to the hard edges of the model where seams will be less visible. For example:

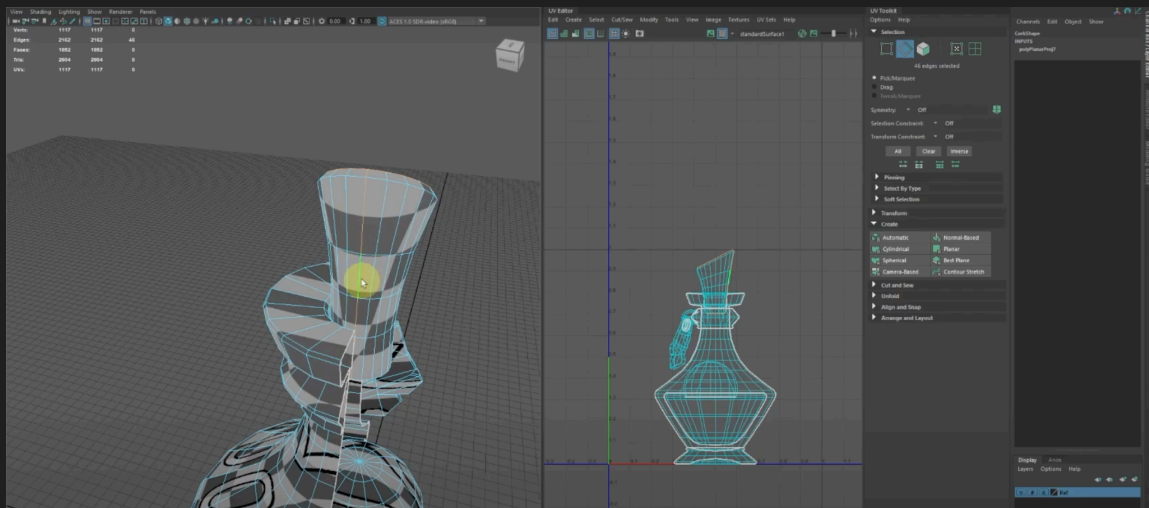
- Add a seam along the back of the collar and around the base where it connects to the bottle. Also separate the top and bottom planes of the cork (Move these objects out if you need to select the edges easier)

- Use a combination of the UV Editor and your perspective viewport to select the edges, and then hit the **Cut** option in the **UV Toolkit** (UV Toolkit should open when opening UV Editor).



2. Add Additional Cuts Where Necessary

Some areas you will need to add cuts in visible areas, for instance even if we make cuts along the top and bottom edges of the cork we still need a seam to unfold the cylindrical part of the cork.

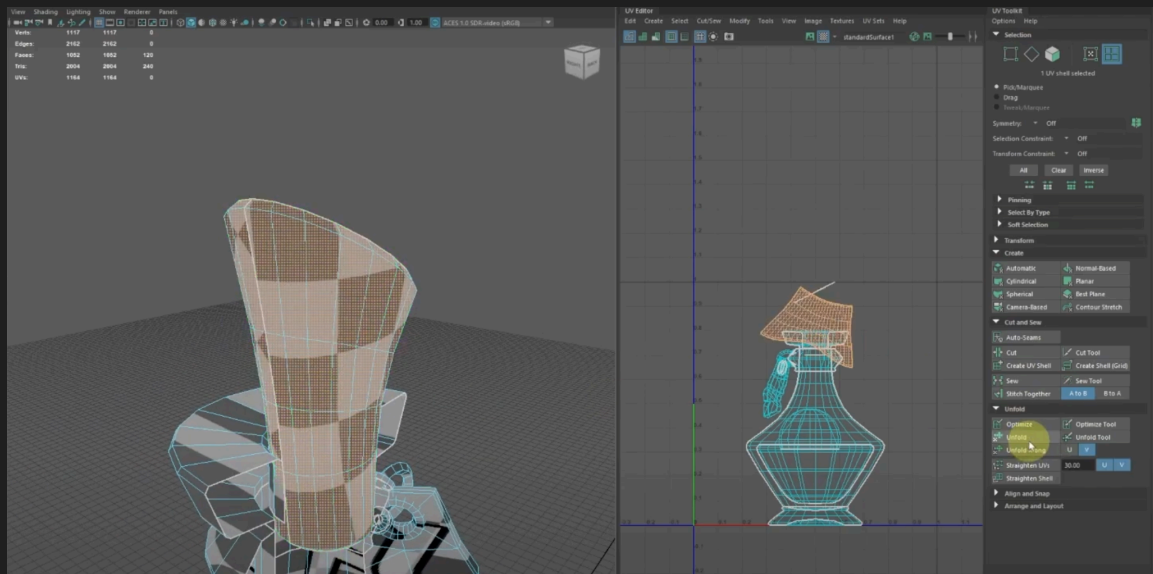


3. Unfolding UV Shells

After making your cuts, go into **UV Shell** mode (Hold Right Click in the UV Editor).

Select each shell and use the **Unfold** function in the **UV Toolkit** to lay out the UVs flat in the UV space.

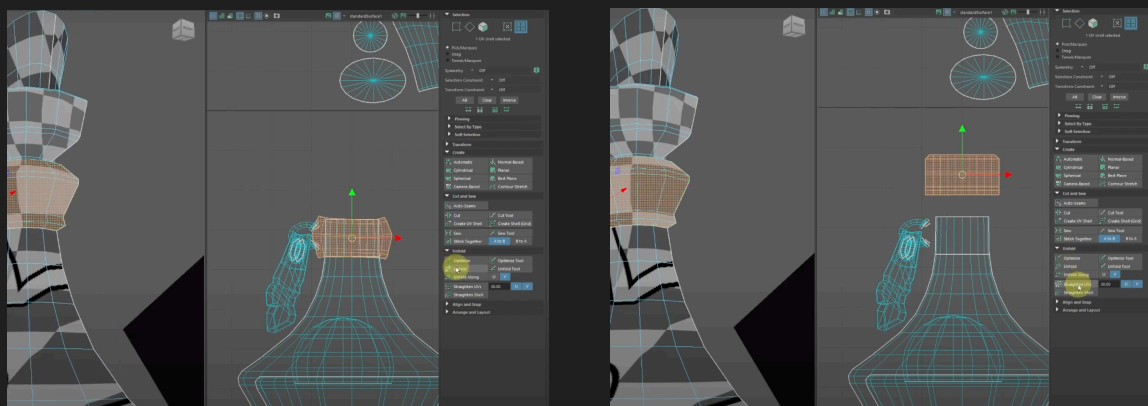
For symmetrical objects or UV shells that already appear pretty straight, use the **Straighten UVs** option in the **UV Toolkit** to align them neatly.



Stage 3.6 - Handling Specific Parts of the Model

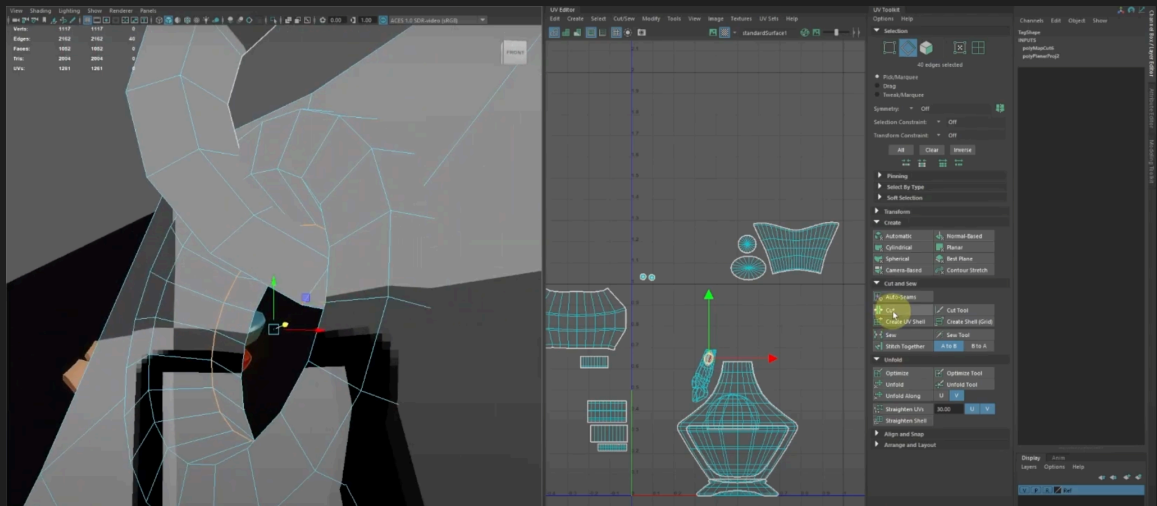
1. Unwrapping the Collar

The collar can be unwrapped without adding additional seams (Outside of the seams we added to the interior edges). Simply use the **Unfold** option. Use **Straighten UVs** to align the UVs perfectly, then adjust any vertices manually if needed.



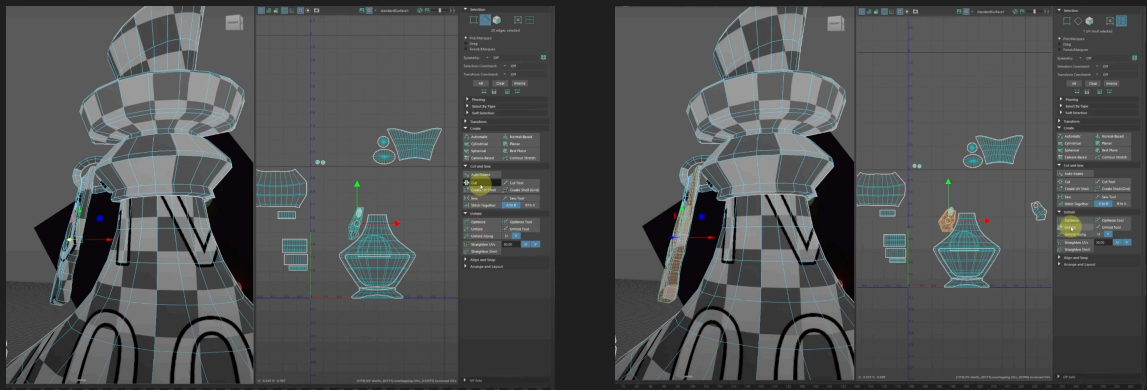
2. Unwrapping the Tauruses

The Tauruses on the collar should unfold nicely after we deleted the back faces. Add a seam on the inside and outside edge of each Taurus that still has all of its faces intact, effectively cutting it in half.



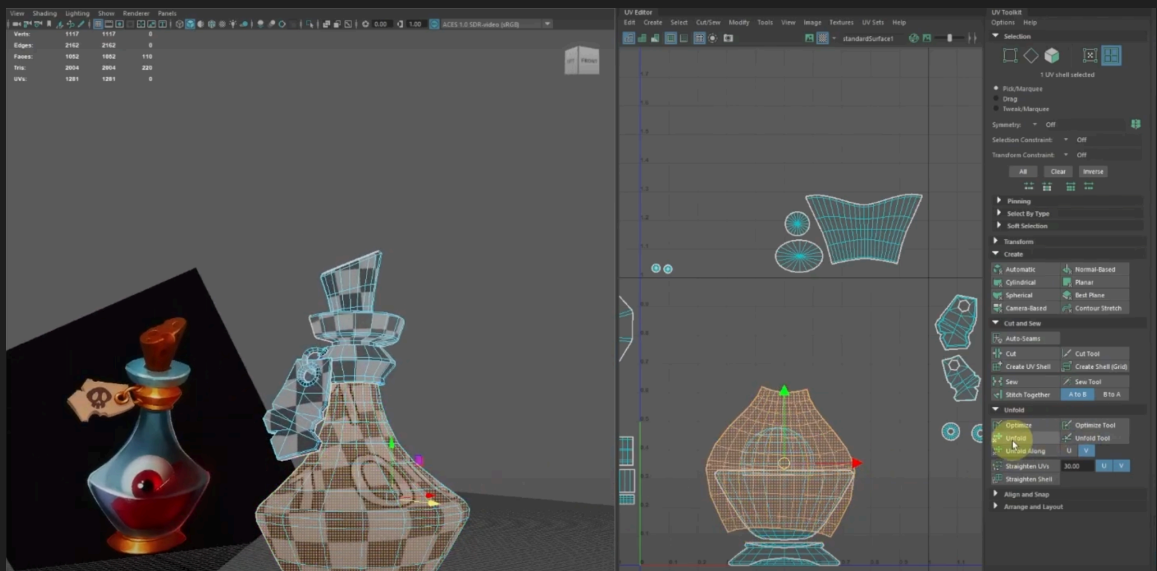
3. Unwrapping the Tag

Cut the tag in half by adding a seam along one of the beveled edges and unfold it in the UV Editor.



4. Unwrapping the bottle

The bottle is very straightforward, since we split the model in half to start with, we should be able to just unfold it with minimal distortions.



Stage 3.7 - Final UV Adjustments

1. Adjusting for Minimal Distortion

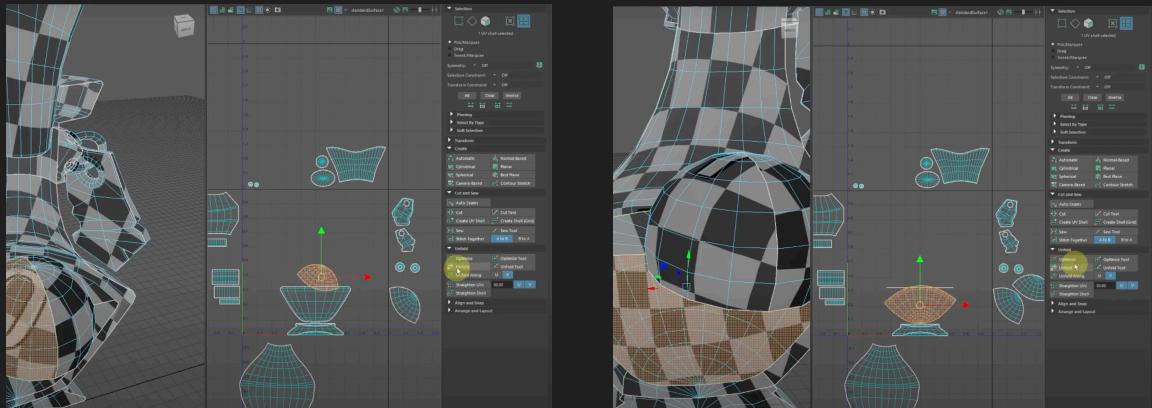
For more complex shapes, like the rim of the bottle, expect some level of distortion.

Use [Unfold](#), [Straighten UVs](#), [Optimize](#) and add additional [Cuts](#) as needed to clean up the layout.

2. Unwrapping the Eye and Liquid

Add a cut down the middle of the eye and unfold it.

Add a seam at the top of the liquid, and use [Unfold](#).



3. Unwrapping the Base

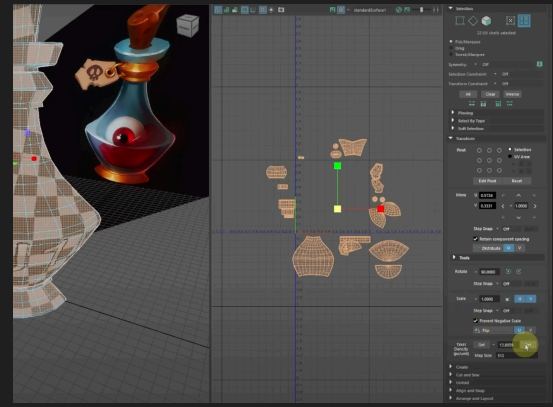
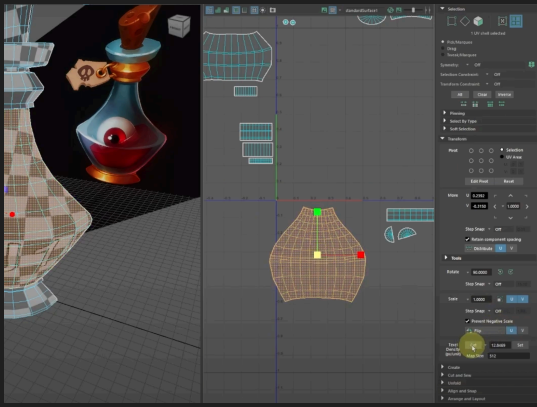
Add a seam along the bottom of the base, as this part of the model will rarely be seen.

Use [Unfold](#) and [Straighten UVs](#) where necessary to complete the process.

Stage 3.8 - Packing UVs and Preparing for Texturing

1. Texel Density

Before we start doing any packing we will want to make sure all of our UV Shells are at the same texel density (Essentially the scale in our UV space). [Select one of our UV Shells > navigate to the Transform tab in our UV Toolkit > find the Texel Density option and press Get > Select all UV Shells and press the Set button](#)

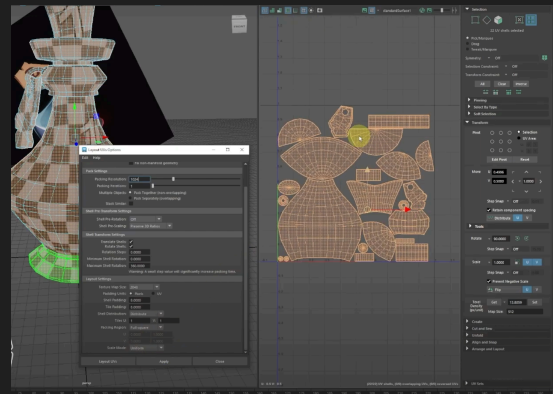
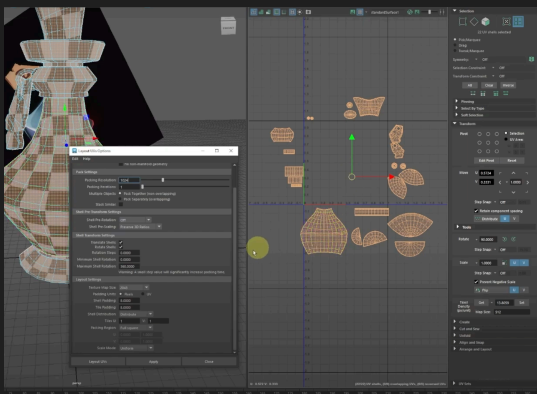


2. Automatic UV Layout Option

Before diving into the manual UV packing process, there's a quick automatic option you can use if you're in a hurry. To access this, follow these steps:

- Open the [UV Editor](#).
- **Shift + right-click** within the UV Editor and select the [small gray box next to Layout](#). You'll find the layout settings that allow you to automate the UV packing process.
- Key settings to focus on are [Shell Padding](#) and [Tile Padding](#). These control the pixel spacing between UV shells. A safe padding value is around 8 pixels.
- Under [Shell Transform](#), set the Max Rotation to 360 degrees to allow the UVs to rotate freely during packing.
- If texel density hasn't been matched already, the layout should automatically adjust for it.
- Once you've set these options, click [Apply](#), and your UVs will be packed automatically with the specified padding and adjustments.

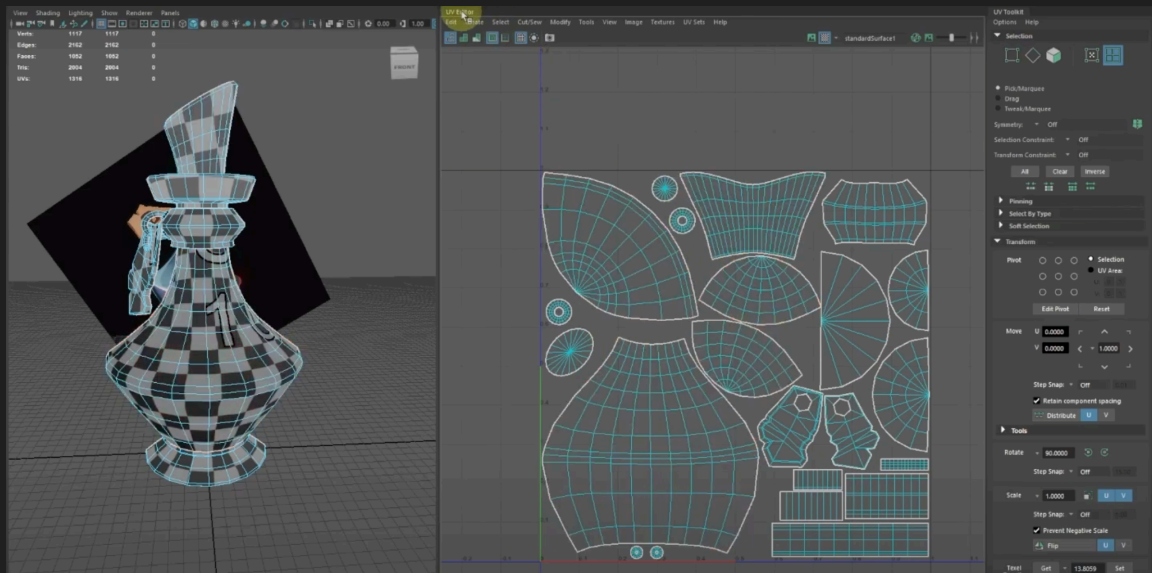
This method is convenient and efficient, but if you prefer manual control, continue with the steps below.



3. Manual UV Packing

Packing UVs manually can give you more control over how efficiently the UV space is used. The process is like solving a puzzle, ensuring you fit everything within the UV space while maximizing texture resolution.

- **Start Dragging UV Shells:** Select and drag the UV shells into the UV space. Consider placing straightened UVs in corners and edges to maximize usage.
- **Adjust Shape Placement:** Round shapes can be trickier to fit, so focus on placing them in a way that minimizes empty space. You may need to rotate and adjust shells for better alignment.
- **Fine-Tune Placement:** For awkwardly shaped objects like the cork, find the best fit wherever possible. If some shells seem too large to fit, scale them down slightly.
- **Ensure Proper Padding:** Make sure there's consistent padding between all shells and along the UV border to avoid bleeding during texturing.
- **Optimization:** If needed, continue adjusting and optimizing the layout, but don't let the process drag on too long.



Once the UV packing looks good, fold the UV Editor and prepare to mirror the mesh for symmetrical objects.

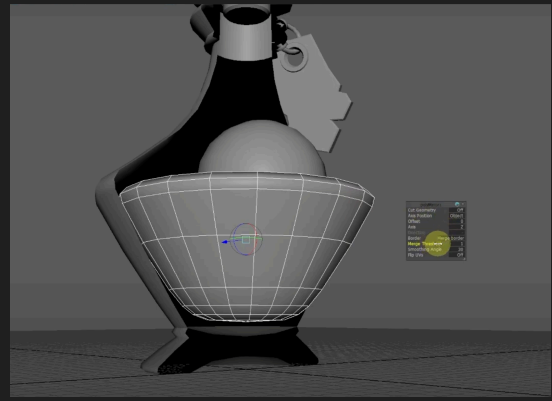
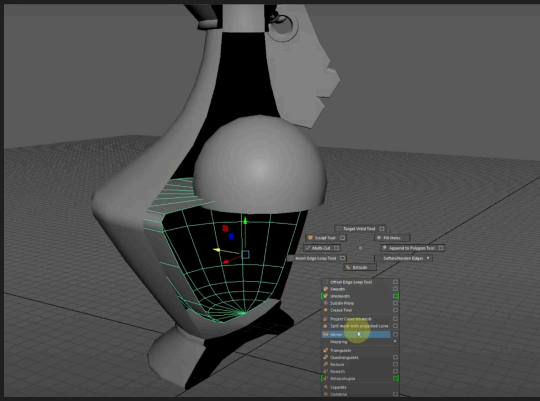
Stage 3.9 Mirroring the Mesh

To mirror the mesh back to the other side:

Switch to Object Mode in the Perspective view.

Select the Liquid Object: **Shift + right-click** and select **Mirror**.

Set the Axis to Z-Axis (May differ depending on which way you split the mesh). Ensure **Cut Geometry** is off and set the **Merge Threshold** to 1 to prevent unwanted merging.



Repeat the mirroring process for the base and bottle objects. Adjust the merge threshold as necessary (e.g., lowering it to 0.5 for the bottle to prevent extra merging). For complex objects like the collar, go into Face Mode to selectively mirror parts of the mesh without duplicating overlapping faces.

After mirroring, verify that the UVs remain intact. Check by selecting a UV shell and dragging it; mirrored UV shells should remain perfectly aligned.

Stage 3.10 - Preparing for High Poly Detailing

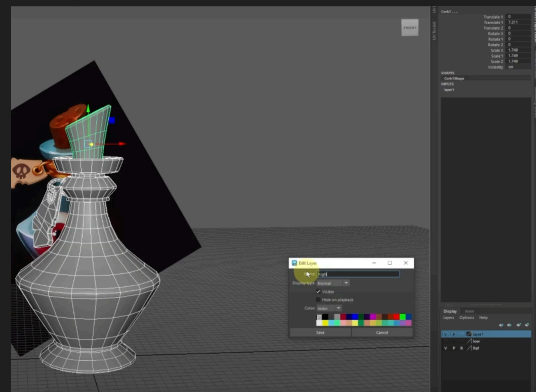
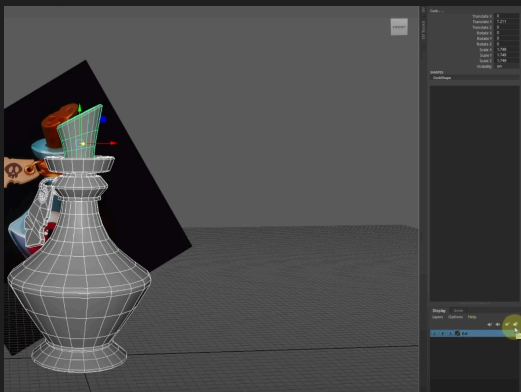
With UVs finalized, the next step is to prepare a high poly version of the model for baking details in Substance Painter. The goal here is to create a detailed high poly model that can bake fine details onto the low poly version.

1. Create Layers:

Select all objects and **create a new layer named Low** for the low poly version. Duplicate the low poly objects (**Ctrl + D**) to create the high poly version, and move these duplicates to a new layer named **High**.

Rename all objects in the Low layer with the suffix "_low" (e.g., "liquid_low") if not named already.

Rename all objects in the High layer with the suffix "_high." These naming conventions will allow Substance Painter to automatically match high poly and low poly objects during the baking process.

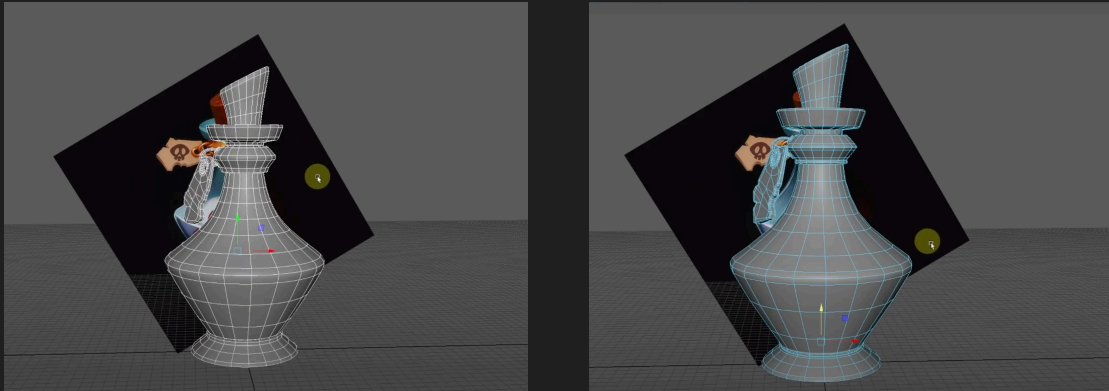


2. Subdivision for High Poly Model:

Select the high poly objects and toggle to the **Smooth Preview (press 3)** to see how the mesh will look when subdivided.

Identify edges that need support for the smoothing process and **Bevel** them accordingly. For example, bevel edges on the cork, collar, and tag to maintain their shape during subdivision. Use multiple segments for sharper edges when necessary.

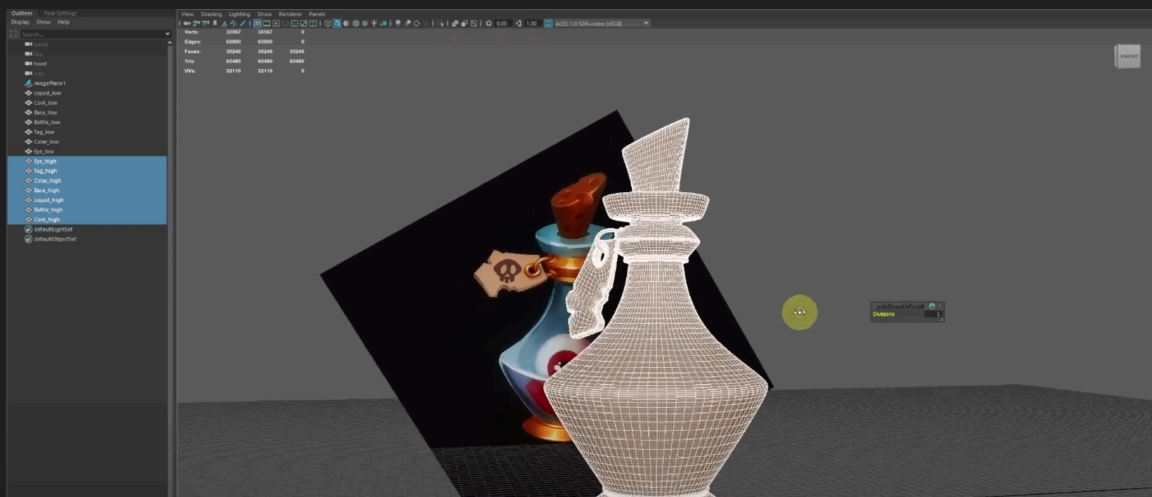
Toggle between **smooth (3)** and **regular view (1)** to assess how the bevels will affect the final shape.



3. Subdivide the Mesh:

After adding supporting edges, select the high poly objects and apply **Smooth (Shift + right-click > Smooth)**. This permanently increases the mesh's subdivision, enhancing detail.

You may need to smooth the mesh multiple times depending on the required level of detail.



4. Finalize the High Poly:

Clear the history on the high poly objects ([Edit > Delete by Type > History](#)).

Ensure the high poly and low poly objects are in the same position in the scene. This is critical for the baking process in Substance Painter, as both versions need to align perfectly.

Once everything is prepared, save your scene. This concludes the UV preparation and high poly creation steps.

Stage 4 - Painter Setup

Resources

Video - <https://youtu.be/HoOgLh7iTqk>

Project Files - <https://bit.ly/4gkGfyl>

Sketchfab - <https://bit.ly/4g9xaIS>

Stage 4.1 - Preparing the Models for Export

1. Finalizing the Models in Maya

Prepare the low-poly and high-poly models for export.

Select the Low Poly Model:

Navigate to the low-poly model in your scene and select it.

[Mesh > Soften Edge](#) to soften all the edges.

[Edit > Delete by Type > History](#) to clear the model history.

Repeat the Process for the High Poly Model:

Select the high-poly model.

[Mesh > Soften Edge](#), then delete its history as well.

2. Exporting Models from Maya

Export both the low-poly and high-poly models as [.fbx](#) files.

Export Low Poly:

With our low poly selected, go to [File > Export Selection](#)

Navigate to your project folder, and save as [potion_low.fbx](#).

Export High Poly:

With our high poly selected, [File > Export Selection](#)

Navigate to your project folder, and save as [potion_high.fbx](#).

Stage 4.2 - Setting Up a Project in Substance Painter

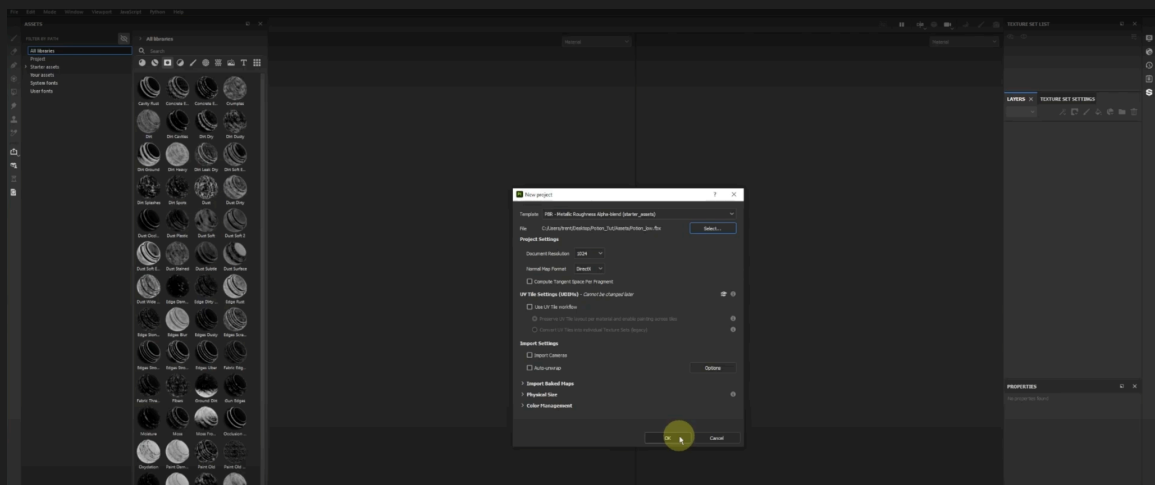
1. Creating a New Project

Once Substance Painter is open, navigate to [File > New Project](#)

For the template, select [PBR Metallic Roughness with Alpha Blending](#).

Resolution: Keep it at 1024x1024 (1K).

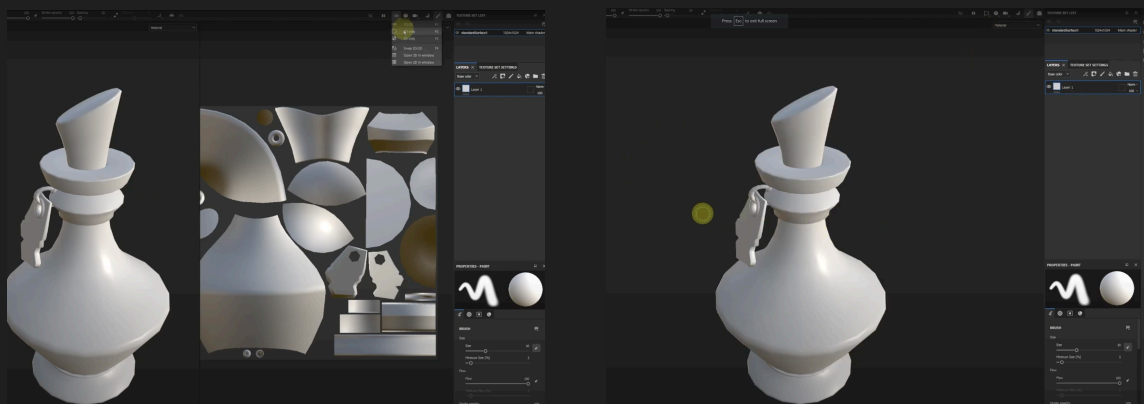
File Input: Navigate to your low-poly model ([potion_low.fbx](#)) and import it.



2. Adjust View Settings:

Toggle between 3D-only or 2D / 3D view using the icons at the top of the screen.

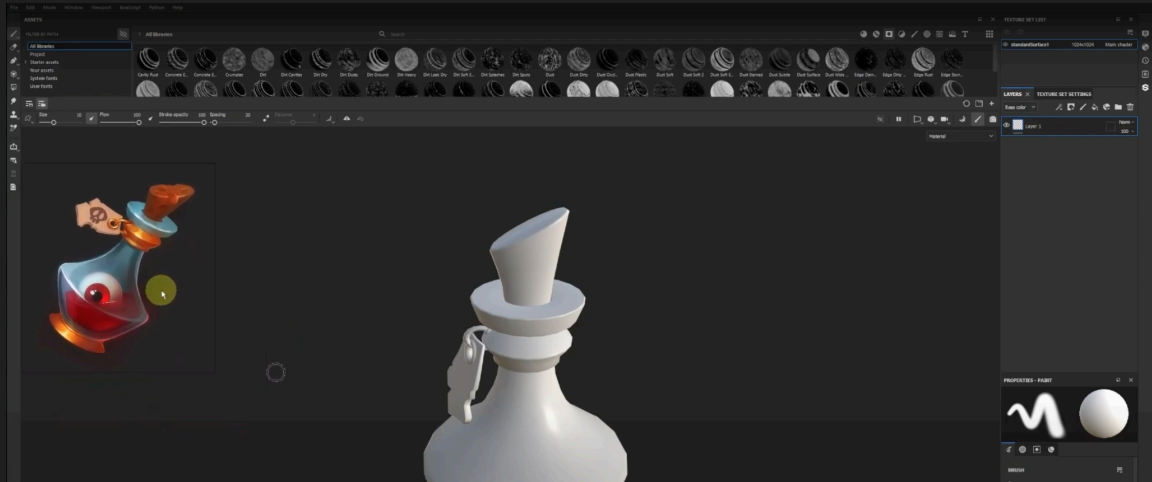
Collapse 2D view for now.



Stage 4.3 - Using References in Painter

Open your [PureRef](#) file we created at the beginning alongside Substance Painter.

Now with the Pureref window set to always show on top, we can always have a clear view of our concept and even use the [Color Picker Tool](#) from Substance Painter to select colors directly from your reference images.



Stage 4.4 - Baking Mesh Maps in Substance Painter

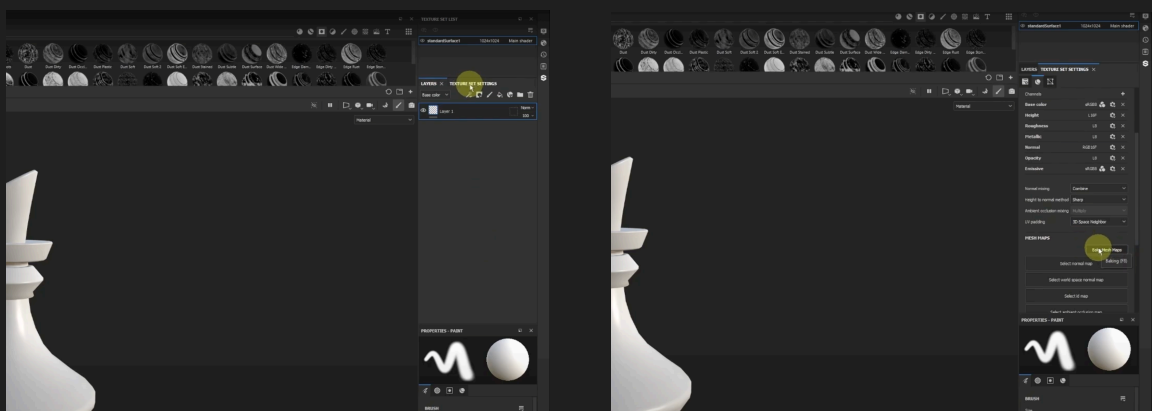
1. Baking the Maps

We will now bake high-poly mesh details onto the low-poly model.

Go to the [Texture Set Settings](#) tab.

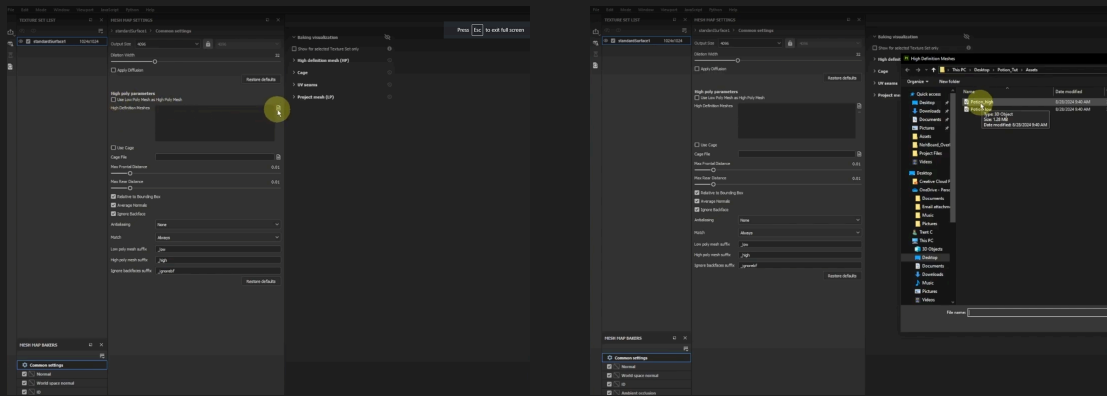
Click [Bake Mesh Maps](#), this will open the baking window.

(Alternatively, you can press the croissant button at the top of the viewport)



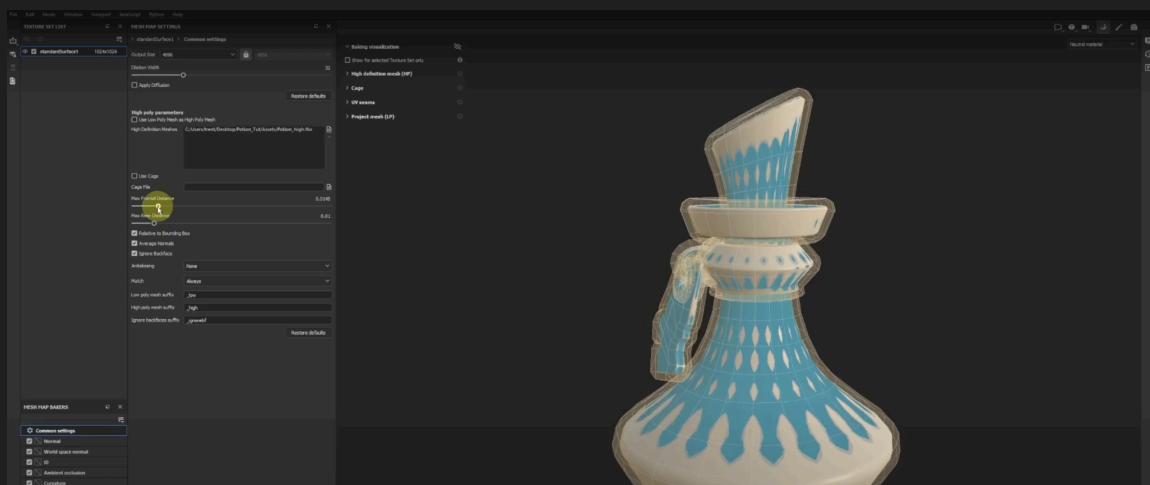
2. Input the High-Poly Model:

In the baking window, under [High Poly Parameters](#), press the [Paper Icon](#) next to the list of high definition meshes, then navigate to and select your high-poly model ([potion_high.fbx](#)).



3. Cage Settings:

Adjust the cage that appears around the model. Ensure there is no clipping, or adjust it to avoid red areas indicating overlap.



4. Matching by Name:

Set **Match** option to **By Mesh Name** to match the high-poly and low-poly models. Check for Name Match: Ensure there are no mismatches between your low-poly and high-poly models. If names match, the left panel will indicate this.

5. Unneeded Maps:

Deselect maps like **Thickness** and **ID Map** as we won't be using these.

6. Start Baking:

Click **Bake Selected Textures**.

Stage 4.5 - Layer Setup for Painting

1. Organizing Layers and Folders

Create separate folders for different material groups and assign base, shadow, and highlight layers. (We can fully set up one folder then duplicate and adjust accordingly)

Folder Creation:

Click the Folder Icon at the top of the **Layers** tab to create a **New Folder**. Since we will be grouping our folders based on their material, name this one **Metal**. (Once complete duplicate folders for the following: glass, cork, tag, liquid, and eye)

2. Painting in Substance Painter

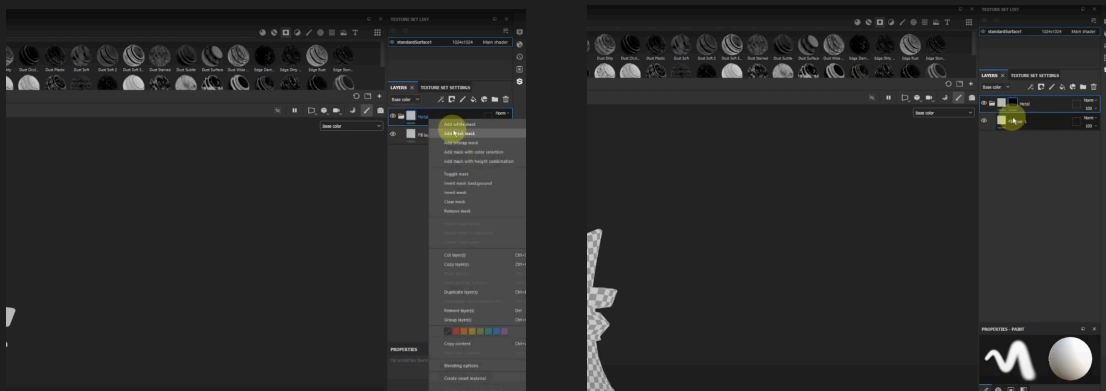
Next we will set up a non-destructive painting workflow using fill layers and masks.

Base Color Layer:

Command: Click the **Fill Layer** icon at the top of the Layers tab to create a fill layer in our folder.

Inputs: Rename the fill layer to **Base**, and use the Color Picker tool to select a base color from your reference image. Adjust the hue, saturation, and brightness if necessary. (Typically you should go less saturated for the base color)

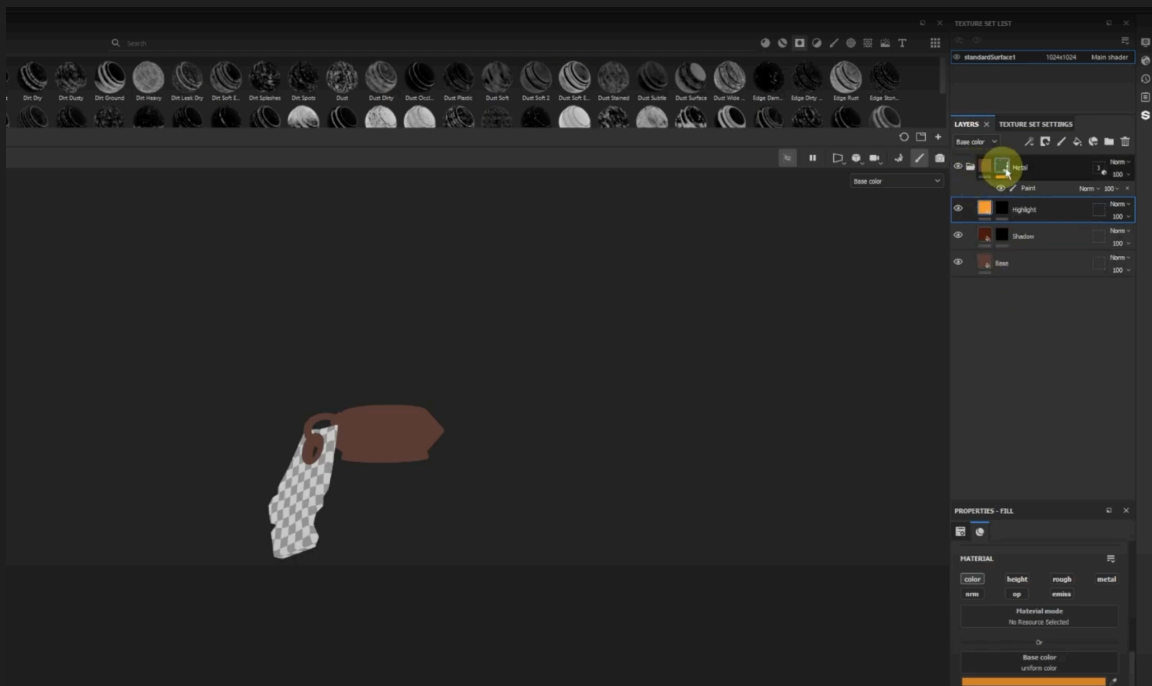
Masking: Right Click the folder itself, select **Add Black Mask**, and use the **Polygon Fill Tool** (4 key) to mask out the correct areas of the mesh (e.g., metal regions for the **Metal** folder). This way no matter where we paint on layers in the Metal folder, we will only paint the areas we masked out.



Shadow and Highlight Layers:

Duplicate the Base Layer: Name it **Shadow**, and repeat the process of selecting an appropriate shadow color. Add a **Black Mask** to the Shadow layer, then Right Click the mask and add a **Paint**. (This will allow us to paint our mask)

Repeat for Highlight: **Duplicate Shadow** layer and rename it to **Highlight**, using the same method and adjust the color to a lighter shade.



3. Using Geometry Masks

Next we will isolate specific geometry for easier painting.

Select the Folder: In the **Layers** panel, select the folder to which you want to apply the **Geometry Mask**.

Access Geometry Mask Properties: Click the **dashed box** next to the blending mode and opacity channel on the folder layer. This opens the Geometry Mask properties window.



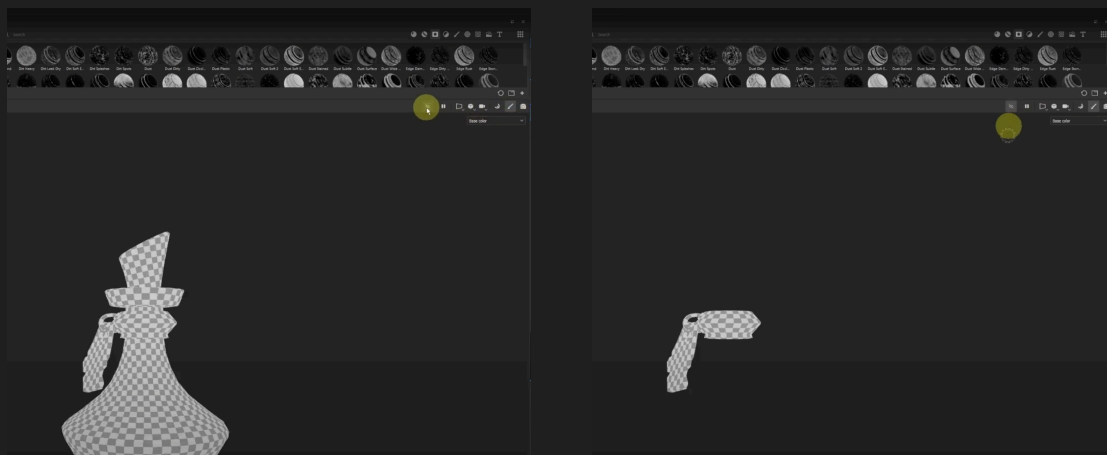
Configure the Geometry Mask:

- In the [Geometry Mask properties](#) window, you'll see a list of all the different meshes in your model.
- Check the boxes next to the meshes you want to include in the mask, and uncheck those you want to exclude.
- This allows you to isolate specific parts of your model for texturing.



Toggle Geometry Mask Visibility:

- With the folder selected, use the "[Hide / Ignore Geometry](#)" symbol along the top of the viewport. This icon looks like an eye with a line through it.
- Click this icon to hide geometry not included in your mask, making it easier to focus on the isolated areas.



4. Organizing Layers

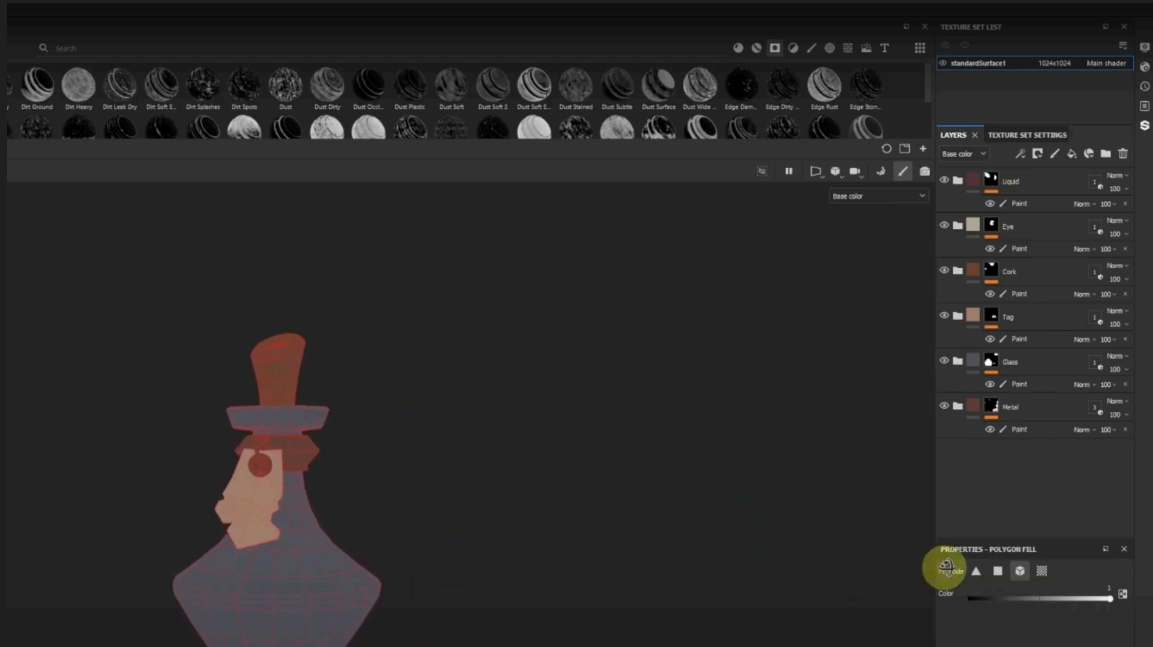
Ensure that each material group (metal, glass, tag, etc.) is isolated in its own folder with respective masks applied.

If you haven't already, for each material, repeat the process:

Duplicate existing folder and adjust the folders mask.

Apply geometry masks.

Adjust the color properties for base, shadow, and highlight.



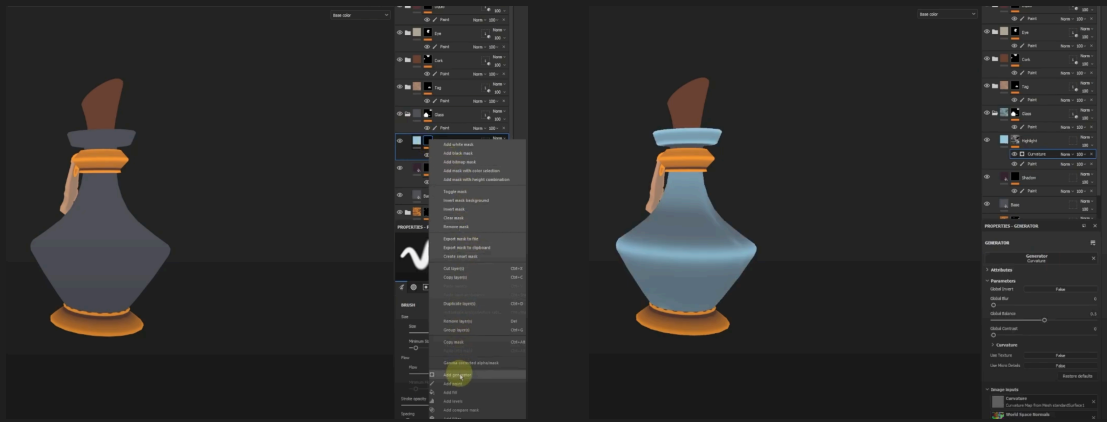
Stage 4.6 - Using Mesh Maps with Generators

We can automatically generate a base for effects like edge wear, highlights, and shadows using baked mesh maps. Before we start doing any painting or effects you may want to switch our material view to only show our base color (This will be a better representation of our final product as we will only need a base color texture). [At the top right of the viewport click the dropdown that says Material > navigate to and select Base Color](#)

1. Adding Generators:

Right-click on a mask for one of our colors (e.g., the [Highlight](#) layer in the metal folder).

Select [Add Generator](#), then choose [Curvature](#). Make sure you move the [Generator](#) below the [Paint](#) we applied to the mask, you can simply click and drag it down. (Makes sure our paint will affect the mask information added by the generator)



2. Adjust Generator Settings:

Tweak properties like [Balance](#), [Contrast](#), and [Blur](#) to customize the generated effect.

Lower the opacity on the [Generator](#) if the effect is too intense.

Stage 4.7 - Saving the Project

Save your progress as a Substance Painter project. [File > Save As > Navigate to your Project Files folder and name the file \(e.g., potion_tex.spp\).](#)

Stage 5 - Texturing

Resources

Video - <https://youtu.be/gXLgQU0qekI>

Project Files - <https://bit.ly/3Xgj3c2>

Sketchfab - <https://bit.ly/4g9xalS>

Texturing in Substance Painter is inherently iterative. You may not achieve a perfect result in the first attempt, so patience and iteration are crucial.

Stage 5.1 - Creating a Custom Alpha in Photoshop

1. Open Photoshop: Drag your reference image onto a new canvas.

2. Select the Skull Icon:

Use the [Magic Wand Tool](#) to select the skull. Refine the selection by adjusting the tolerance or using additional selection tools if needed.

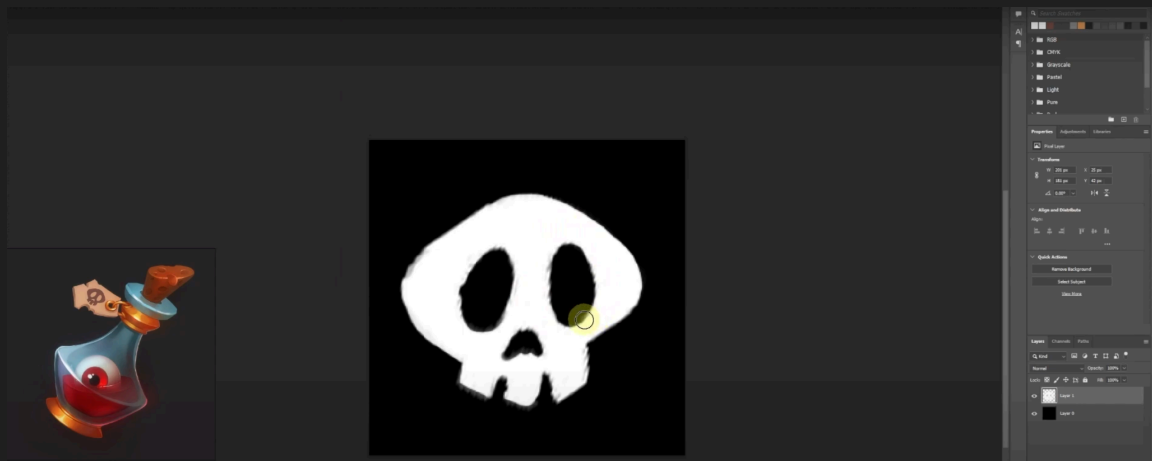
3. Prepare the Alpha:

Create a new layer ([Ctrl+Shift+N](#)), go to [Edit > Fill](#), and fill the selection with white.

Copy the skull ([Ctrl+C](#)), then create a new 256x256 canvas ([Ctrl+N](#)), unlock the background layer, and fill it with black.

Paste the skull ([Ctrl+V](#)) into this canvas. Use [Ctrl+T](#) to transform and scale the skull, ensuring it fits well within the 256x256 area.

Clean up any pixelation or jagged edges with a hard brush set to pure white.



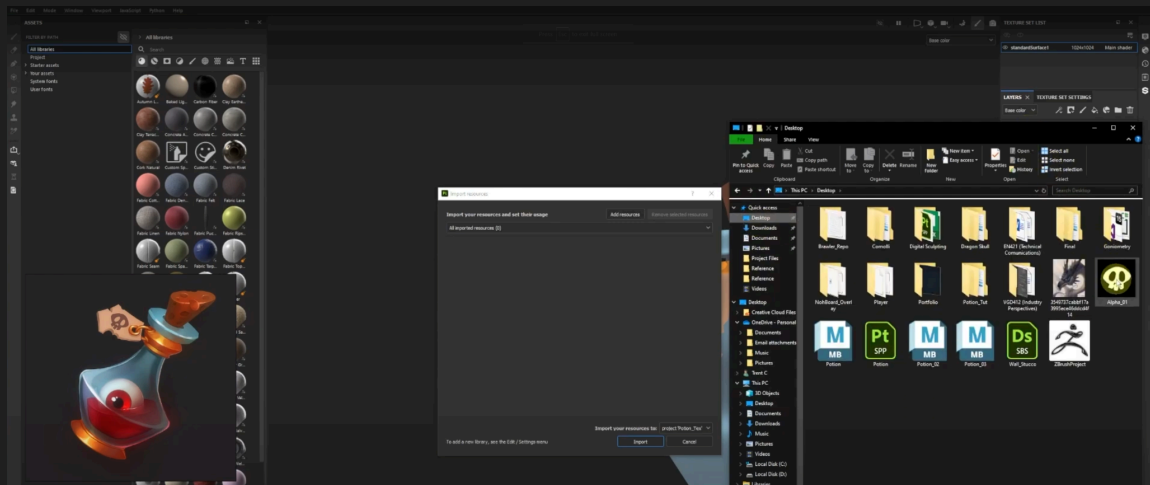
4. Export the Alpha:

Save the image as a PNG ([File > Export > Quick Export as PNG](#)) with an appropriate name like "Alpha_01."

Stage 5.2 - Importing the Custom Alpha into Substance Painter

1. Import Alpha:

Click the [plus icon](#) at the bottom of the [Shelf](#) panel to import assets. Drag the saved "Alpha_01.png" file into the import window.

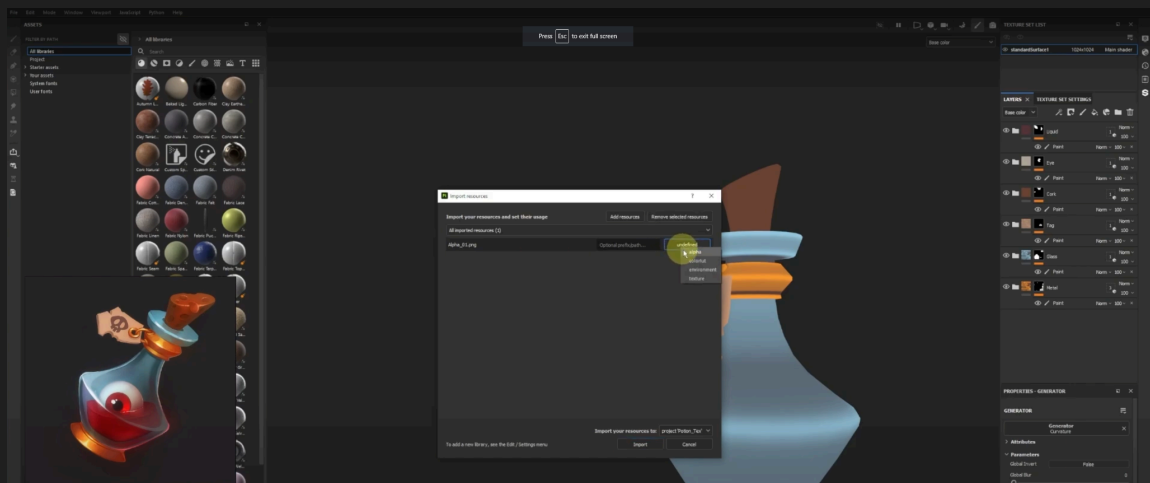


2. Define Alpha Type:

Under the **Undefined** tab, set it as an Alpha.

Choose how to save it:

- **Session**: Temporary use for the current session.
- **Project**: Save with the current project.
- **Library**: Add to the asset library for future use. For this task, select **Project**.



Stage 5.3 - Stamping the Alpha onto the 3D Prop

1. Create Stamp Layer:

In the Layers panel, open the tag folder and create a new layer. Name it "Stamp." You can just duplicate the shadow layer and drag it above other layers for visibility.

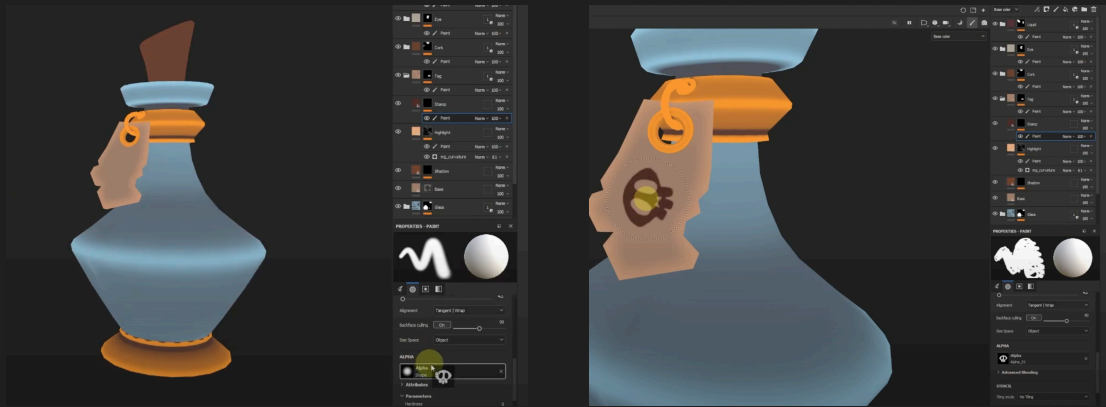
2. Setup and Use Alpha:

Use the Color Picker to select a complementary color from the tag to blend the alpha effectively.

Go to the **Mask** of the Stamp layer, navigate to the **Alpha** tab, and drag your custom alpha from the shelf or library.

Adjust brush size and rotate the alpha by holding **Ctrl + Left Click** and dragging vertically.

Stamp the skull icon on both sides of the tag, ensuring correct placement and alignment.



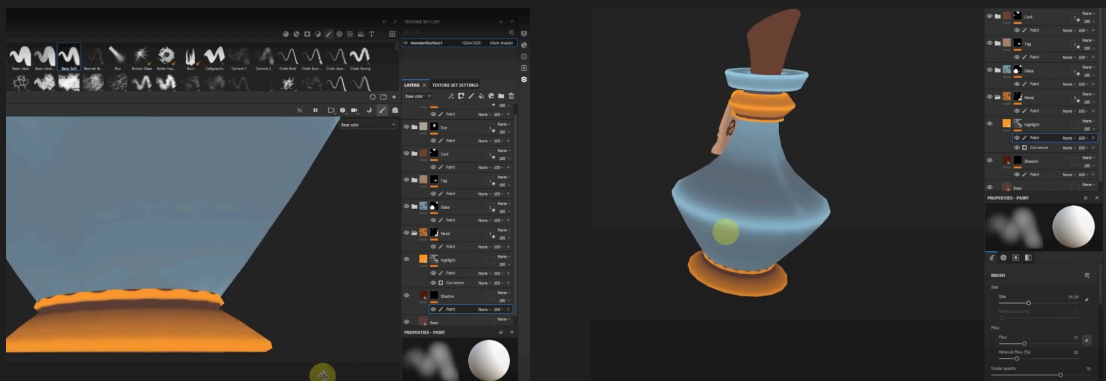
Stage 5.4 - Setting Up for Hand-Painting

1. Brush Properties:

Select a **Soft Brush** from the **Brush** panel. A drawing tablet is recommended for better control over brush strokes.

Configure the brush settings:

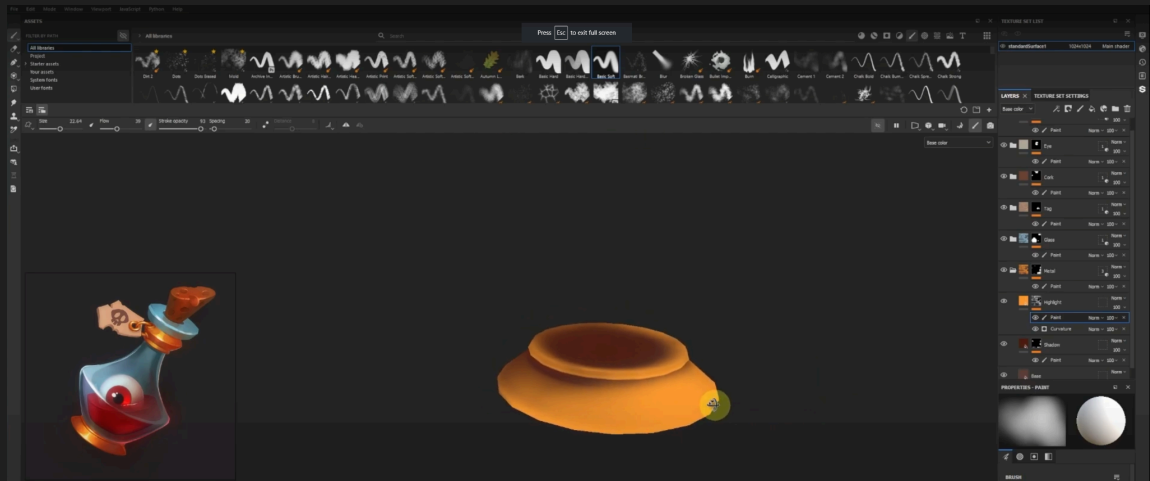
- **Disable Size Pressure:** Ensures a consistent brush size.
- **Enable Pressure Flow:** Controls color buildup based on pen pressure.
- During this process you will want to adjust your max flow and opacity as you work to gradually build up value.



2. Define Light Source:

Set up your light direction, since our UV's are mirrored we need to have the light hit where the center seam on our mesh is. We will want to paint the prop so the light source is from the front, fading towards the sides. This will guide how you

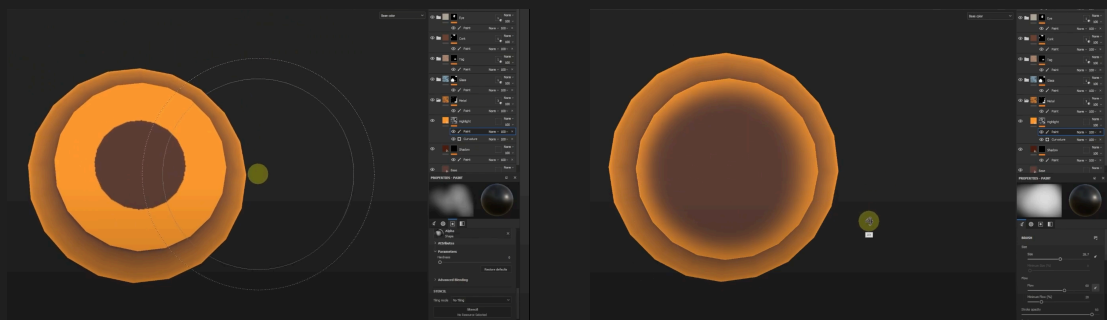
add shadows and highlights. (Look at our concept for reference in how light is dispersed on the object)



Stage 5.5 - Hand-Painting Techniques

1. Painting With Masks:

Select one of the **Paints** we added on one of the Highlight or Shadow masks
Switch between Polygon Fill mode (**4 key**) and Brush mode (**1 key**) to isolate areas that we might have some hard edges from baking or where we want to quickly add more value, (eg. where the glass meets the base). (Using Polygon Fill will completely fill these areas with color but we can use our soft brush to knock down the color and fade it back)

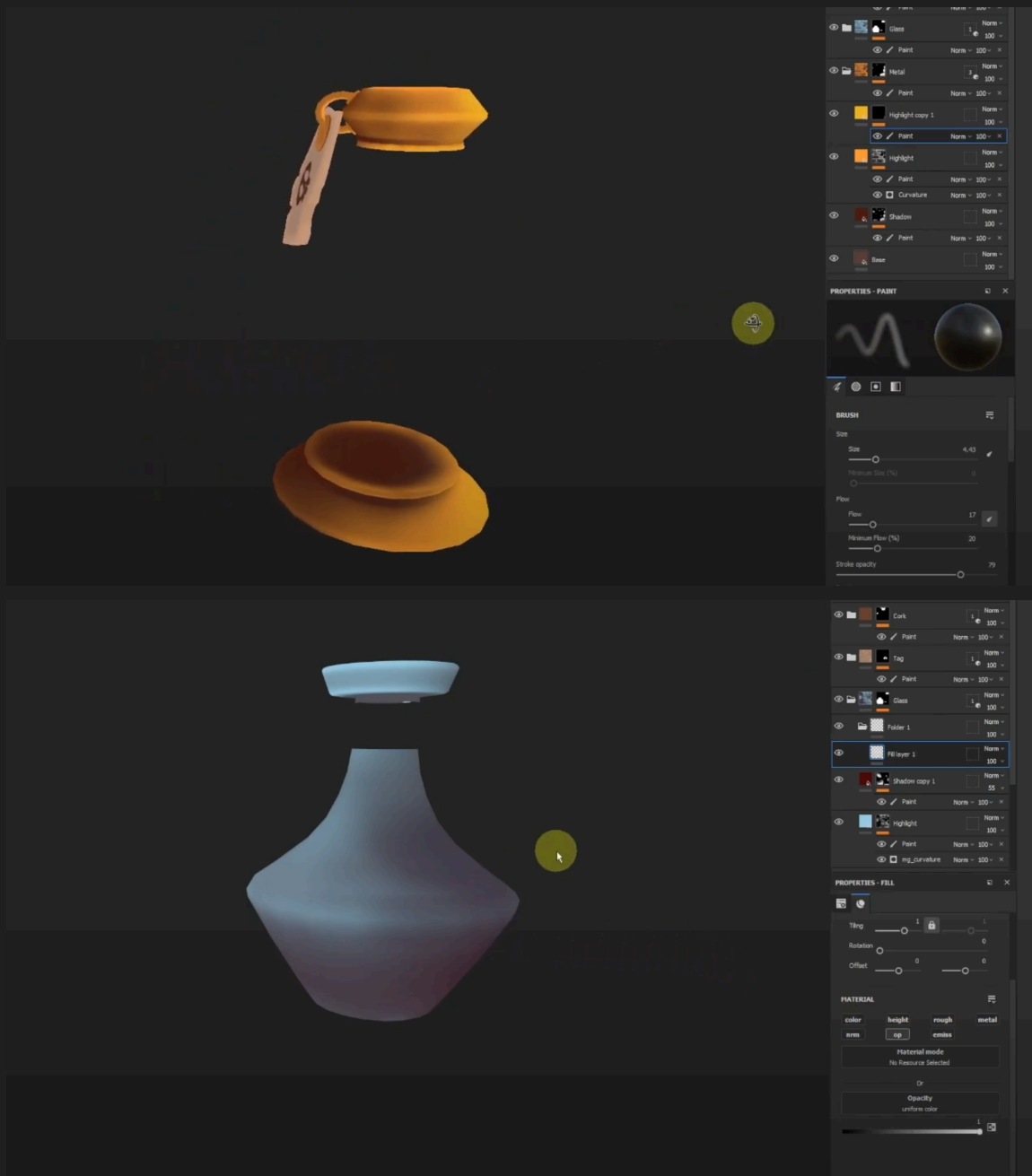


Use the **X** key to toggle between Black and White Channels:

- **White** reveals mask details.
- **Black** hides them.

Gradually build up value, blending strokes seamlessly. For example add more highlights where your established light direction is hitting and lightly fade it back and incorporate your shadow color

Use soft brushes for general shadows and highlights, then switch to hard brushes for detailed edge work.



2. Opacity Adjustments:

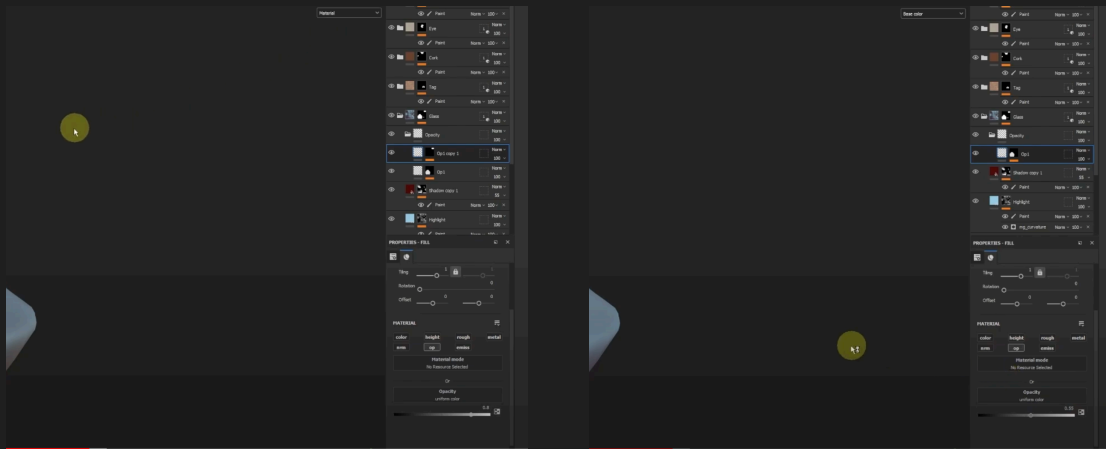
Create Opacity Layers:

Add a new folder in your **Glass** folder for **Opacity** and add a fill layer. Name it "op1". **Alt + Click** the opacity tab on the layer to only use the opacity channel.

Adjust Opacity:

Add a black mask to the "op1" layer. Use Polygon Fill (**4 key**) to select the UV shell of the bottle, painting with white on the mask to reveal effects.

- Set the opacity value to 0.55 for the bottle. For the top lip, duplicate the layer, clear the mask, and select the UV chunk with a different opacity value (e.g., 0.8).



Stage 5.6 - Adjusting Opacity, Highlights, and Details

1. Testing Opacity:

Toggle between Material View and Base Color to preview opacity effects. The final render will provide a clearer view of the adjustments. (This is done through the dropdown at the top right of the viewport)

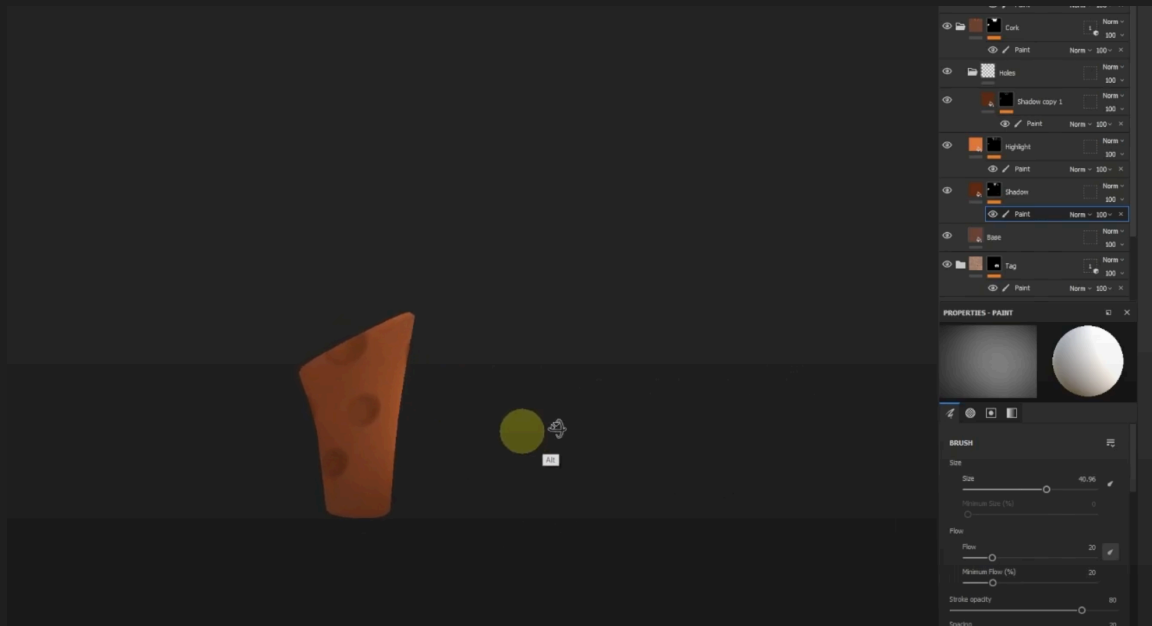


2. Highlighting the Cork:

Toggle the [Geometry Mask](#) to isolate the cork.

Use a soft brush to paint highlights, focusing on the edges.

Add holes by creating a new folder called "Holes," duplicating the shadow layer, and painting circular holes with a hard brush. Add gradual shadows with a soft brush.



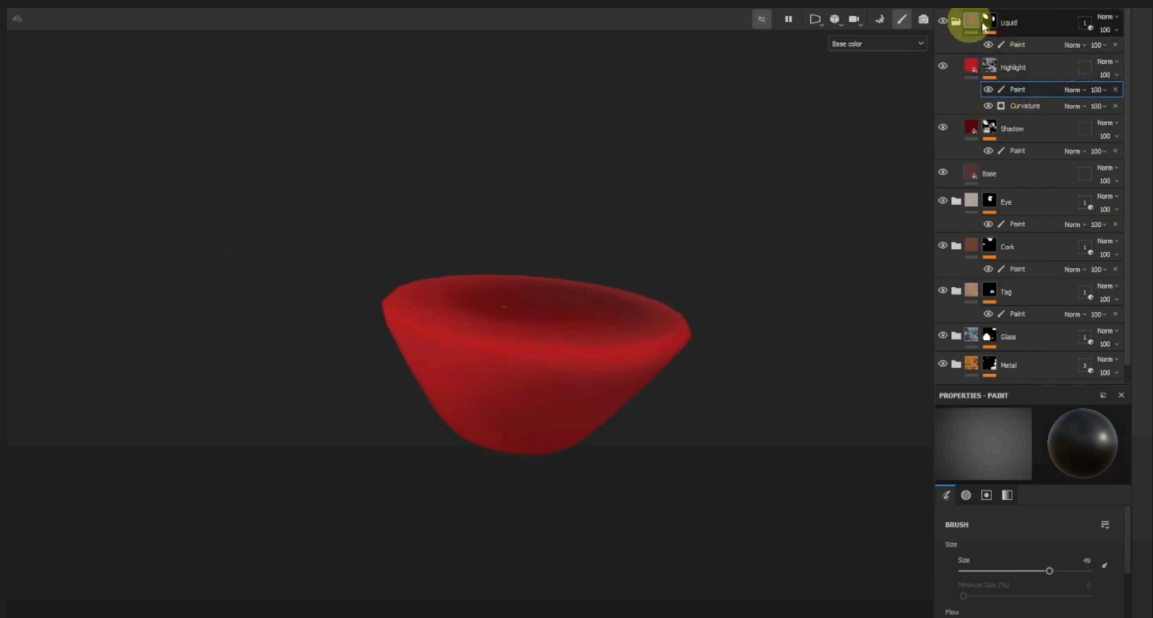
3. Detailing the Eye:

Toggle your [Geometry Mask](#) so we can effectively paint the eye.
 Create a new folder named "Pupil" and add a Fill Layer with only Color enabled.
 Paint the pupil with a dark red shade using a hard brush.
 Duplicate the pupil layer, lighten the color for highlights, and add small white highlights for reflection.



4. Detailing the Liquid:

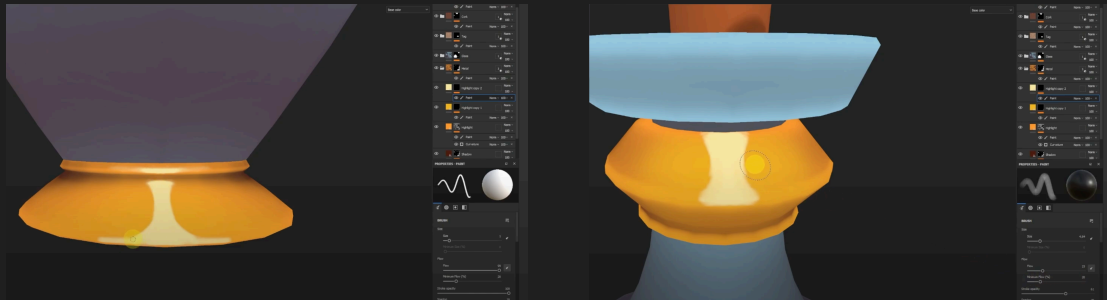
Toggle your [Geometry Mask](#) so we can effectively paint the liquid.
 Apply a [Curvature Generator](#) to enhance liquid surface highlights. Adjust intensity by painting over it.
 Blend shadows from the base and add front-edge highlights based on how you've been rendering the light, creating a smooth transition.



Stage 5.7 - Final Details and Rendering

1. Edge Detailing:

Duplicate the final highlight layer for metal and use a hard brush to outline prominent edges. Alternate between painting and softening for a natural look.



2. Final Touches:

Spend some time detailing and refining the texture until you are satisfied with it. If you want to see an overview of the entire process the associated video for this chapter covers this in detail.

Stage 6 - Sketchfab

Resources

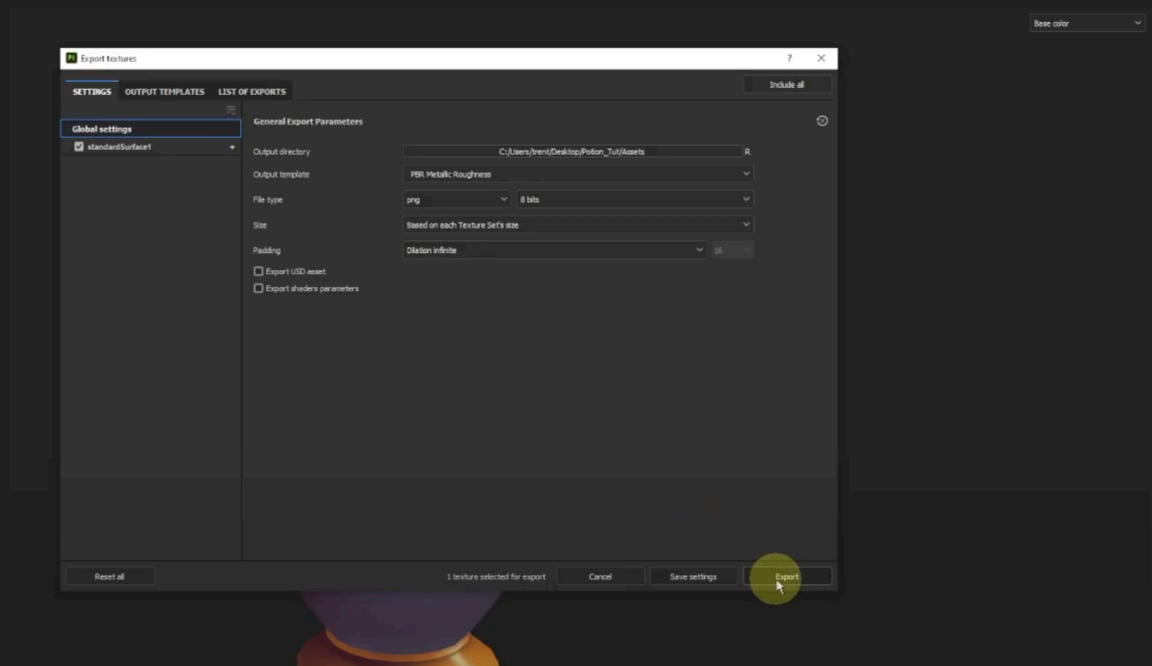
Video - <https://youtu.be/LF5V7hejPwU>

Project Files - <https://bit.ly/4dVfUpd>

Sketchfab - <https://bit.ly/4g9xaIS>

Stage 6.1 - Exporting Textures

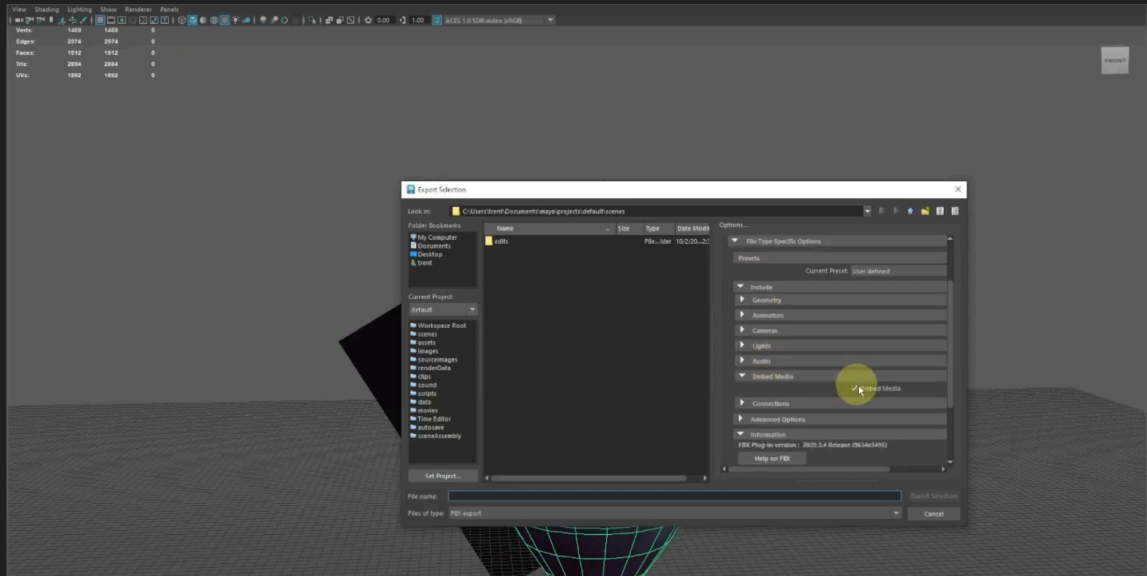
1. Save your project in Substance Painter.
2. Go to **File > Export Textures**.
3. Set the **Output Directory** to your **Assets** folder and select the appropriate folder.
4. Choose the output template for **Base Color**. Ensure the resolution is set to 1K.
5. In the **Output Templates** section, uncheck all options except **Base Color**. Set the file format to PNG to preserve opacity information.
6. Click **Export** to generate your texture files.



Stage 6.2 - Preparing the Model in Maya

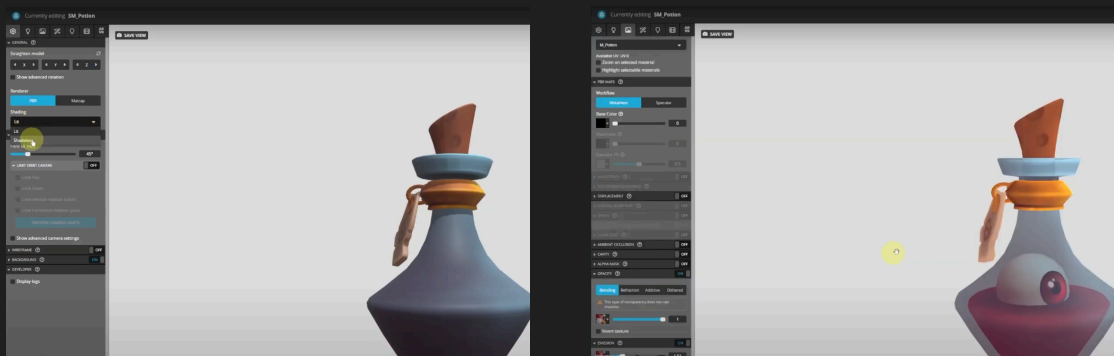
Stage 6.4 - Exporting the Model

1. Select the combined mesh and go to [File > Export Selection](#).
2. Choose the FBX format and ensure [Embed Media](#) is selected under [File Type Specific Options](#).
3. Save the file in the appropriate folder.



Stage 6.5 - Uploading to Sketchfab

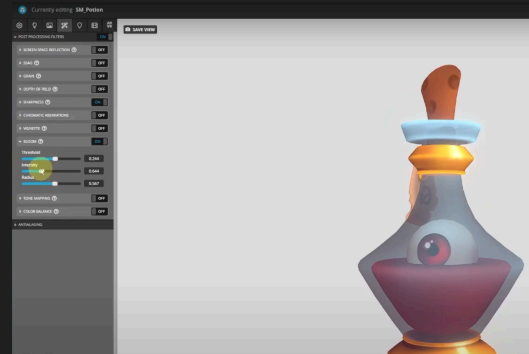
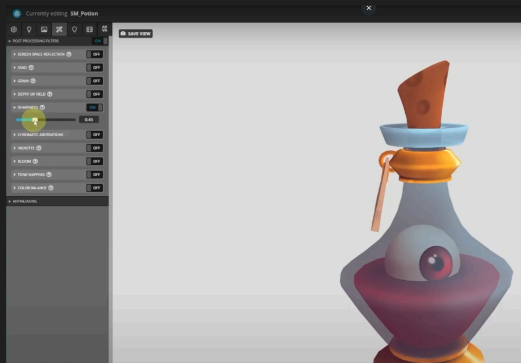
1. Open Sketchfab and click [Upload](#).
2. Drag and drop your FBX file into the upload area and click [Upload](#).
3. After the upload is complete, click [Adjust 3D Settings](#) under your model preview.
4. In the [Scene](#) tab adjust the [Shading](#) settings to [Shadeless](#) or [Unlit](#).
5. Navigate to the [Material](#) tab and set the [Base Color](#) to 0 and load the Base Color Texture into the [Emission](#) channel (Adjust the Emission values as you see fit).
6. Last thing in the [Material](#) tab is to load our [Base Color Texture](#) into the [Opacity](#) channel



Stage 6.6 - Adjusting Post-Processing Settings

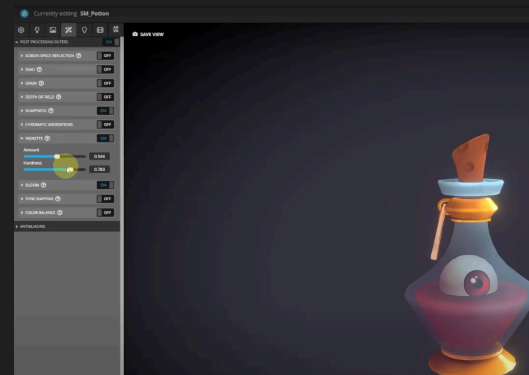
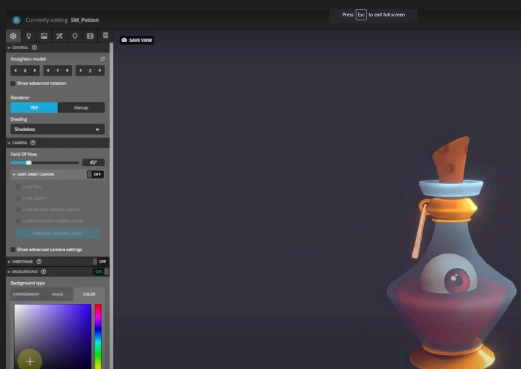
1. Add [Sharpness](#) and adjust the value (e.g., 0.45) for clarity. Don't overdo it.

2. Apply **Bloom** effects and adjust settings to enhance the visual appeal.
3. Add a **Vignette** for a more dynamic presentation, feel free to come back and adjust this after we set up the background.



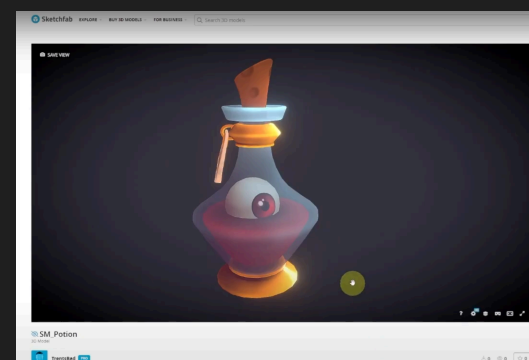
Stage 6.7 - Adjusting the Background

Navigate back to the **Scene** tab and find the **Background Dropdown**. Set the background to a **Solid Color**, I prefer to use a darker less saturated color.



Stage 6.8 - Finalizing and Publishing

1. Position your model for an appealing thumbnail and save the settings.
2. Set the model to **Private** or **Public** based on your preference. Publish the model and share the link if desired.



Conclusion

Congratulations on successfully completing this tutorial! Throughout this guide, you have followed a structured approach to creating and texturing a 3D prop, from the initial concept drawing to the final presentation on Sketchfab. You have learned how to export textures, blockout and refine models in Maya, and apply various post-processing effects to produce a polished result. This tutorial has introduced key practices, including UV mapping, hand-painting techniques, and model optimization, providing you with a solid foundation for future projects. I encourage you to take this knowledge to advance your skills in 3D modeling and texturing, applying these techniques to a wide range of creative endeavors. Keep refining your craft as you continue on your journey in game-ready art development!

Sources

3DEX. YouTube. (n.d.). <https://www.youtube.com/@3dextrude>

Autodesk Maya 2024. Help. (n.d.). <https://help.autodesk.com/view/MAYAUL/2024/ENU/>

Games Artist. (2024, September 1). <https://gamesartist.co.uk/>
